The Builder.

Vol. XVI.—No. 793.

The Trade Museum and Technological Collection in the Crystal Palace.

SILENTLY and slowly a very large and valuable technological collection, under the heads of vegetable, mineral, and animal, has been formed in the second gallery of the central transept of the Crystal Palace, on the garden side, which deserves what it does not yet get,—the careful examination of all who desire to derive from visits to the extraordinary building at Sydenham something more than mere amusement. Dr. David Price, who has had the charge of its formation, and is still engaged upon it, has had many difficulties to contend with: the fear lest the educational character of the establishment should be swamped by endeavours on the part of the directors to attract the multitude by means most likely to effect it, without any care as to what those means were, has led many to hesitate who were about to present specimens. The public, however, are becoming a little reassured on this head, so that we may expect that Dr. Price's praiseworthy perseverance will be rewarded by many accessions to his cases. In the meanwhile, however, the collection is, as we have said, of great extent, and, in some departments, of unrivalled completeness. A proper account of it would involve essays on all the industrial arts. We must content ourselves with a glance at the contents of the cases, and such a notification of them as may serve to convey an idea of the collection, and induce our readers to examine it for themselves. A plan suspended in the gallery shows the location of the several divisions. The vegetable products come under two heads—those used in the arts and those used as food: the specimens are labelled with brief items of information, and a second plan in the gallery gives visitors the means of finding, in the flower-beds below, many of the various plants themselves in their growing state—a capital arrangement. Under the head of vegetable products used in the arts, of course we find dye woods, tanning, gums, resins, and gutta-percha in their numerous forms and applications, vegetable tallow, and some newly-imported oils and dyes. Paper-making is somewhat largely set forth, including the new cartridge and rocket cases, made without a seam by simply drawing a mould through the pulp. If the glycerined paper easily take impressions from wood engravings as good as some specimens exhibited, it deserves the attention of all engaged in the production of illustrated literature. What is called parchment paper, the result of accidentally dipping cartridge-paper in a solution of sulphuric acid, would be useful where toughness is required. In examining the papier-mâché case, the mode adopted for gilding ornaments upon the finished specimens will be seen to be very ingenious, but very wasteful of gold, unless, indeed, it is again collected. The best papier-mâché consists, as most know, of sheets of prepared paper pasted on to an iron mould, then hardened with linseed-oil, and dried. Looking at the specimens of cork, many visitors will learn for the first time that it is an oak,—one bough is full of acorns. The examples of the medicinal plants exhibited have an additional interest, from the circumstance that these are for the most part supplied to us by the sect known as the Society of Shakers, in the United States. Here is one of their pattern-books, a very creditable production. Little facts get stated which ought to induce examination, that we may know the reason why. For example, the nut, *strychnos potatorum*, is called the clearing nut, being used in Madras to precipitate the impurities in water: is the way in which this operates known?

Fibres form an important class: here, of course, is seen cotton in all its shapes,—from the bursting pod to the morning dress. It would make a story to trace the history of a cotton gown: the material, perhaps picked by "Uncle Tom," fetched from the United States; the science and skill of years united to produce the machinery at Manchester by which it is manufactured; a journey to France, either to buy or steal a pattern; optical science and the engraver called in to place this upon the material, and then the result sold to Molly, the housemaid, for twopence a-yard; the manufacturer, the warehouseman, and the linen-draper all ultimately making colossal fortunes by repetitions of the transaction, to say nothing of the slaves fed, ships chartered, artizans supported, mills built, and clerks, travellers, porters, and a hundred others maintained in a decent condition, and enabled to bring up fresh families of clerks, travellers, and porters!

The violet colour seen in one of the cases is a new dye, just obtained from coal-tar, and will be extensively applied if it can be obtained in large quantities and prove permanent. That pink is obtained from *guano*, and the green from the colouring matter of grass,—chlorophyle,—by Schlumberger's process.

The foreign muslins are objects for imitation: the specimen from Dacca is worth two guineas a-yard there. The fibre that has grown most into use is that of the cocoa-nut tree,—the extent of the commerce in which passes belief. *Coir*, as it is termed, which is mostly obtained from the husky covering of the nuts, is in some places the established standard of barter, its value not varying. Coir cables are coming into great use. Sir W. Hooker has urged that much of the cellular matter that comes to be wasted when the fibre is extricated might be used for the manufacture of that desideratum,—paper.

Vegetables used for food are shown by models. Tea and its substitutes make an interesting case, and so does tobacco to some. One drop of the nicotine, or poisonous principle of tobacco, you see it in the little bottle there, will kill a dog; a few more, a man. Its teaching would seem to be,—don't smoke.

The mineral products have special interest for a large body of our readers. The cases devoted to the silicates show the constituents of glass and the steps in the manufacture of a wine-glass,—the three little balls of glass from which are formed the bowl, the stem, and the foot. The colouring material of the piece of ruby glass is gold, which, by the way, does not produce the colour when first mixed with the glass, but has its effect when subjected to greater heat. The frosted glass, that has so agreeable an effect on the dinner-table, is produced by plunging the vessel, when hot, into cold water, which fractures the whole surface. The manufacture of sheet glass and crown glass is illustrated, and the mode of etching on glass, by which ornamental effects are obtained at small cost, is shown. The pattern is marked out on the glass plate with a varnish. The plate is dipped into hydrofluoric acid, and this acts on all the exposed surface. The varnish is then washed off by a solvent, and leaves the pattern in transparent glass. Mr. Abel's process for the preservation of wood from fire is here exemplified. It consists in treating the wood with silicate of soda and a wash of lime, and then again with the silicate.

Several plans have been patented for affording to wood some amount of protection from fire; thus Maugham's patent consists in saturating the wood with an aqueous solution of phosphate of soda and muriate or sulphate of ammonia; and in Jackson's process, the wood is impregnated with a solution of salts of zinc, and of ammonia. In other processes, the protecting material is forced into the wood by the application of considerable pressure. Mr. Abel's plan has the merits of cheapness and simplicity, and some experiments made by Colonel Sandham, and recorded in the "Professional Papers" of the corps of Royal Engineers, seem to show that silicate of soda, as applied by Mr. Abel simply as a coating, in conjunction with lime-wash, has great power in retarding the inflammability of wood. In applying it to wooden buildings the wood should be completely coated with the preparation before it is put together.

The timber and woodwork of the huts at Aldershott, we are told, are now so prepared. Had some such precaution been taken when we early pointed out the risk that was being run, and the trumpery nature of the improperly-placed buildings there, the country would have saved money.

In tracing the manufacture of salt, a reason is found for the different shape and appearance that rocks present upon the earth, when we see that salt, which, when boiled rapidly, forms small crystals, if allowed to crystallize slowly, forms large masses of a totally different aspect. Plasters and cements will be found duly set forth, aluminium and asbestos. In the case appropriated to lead may be seen something of the making of white-lead; and as this may not be understood by all our readers, we will pause a little longer here, and see what the labels say. White-lead is carbonate of lead containing hydrated oxide of lead. Analysing various samples produced by the Dutch method of manufacture, it is found to consist of,—

Oxide of lead . .	84·7	. . . 85·372
Carbonic acid . .	13·373	. . . 12·173
Combined water	1·112	. . . 1·167

And what is this method? It may be briefly told. Refined lead is cast into small crosses, so as to expose a large surface of metal. The crosses are piled on earthen pots, about seven to each pot, containing dilute pyroligneous acid or wood vinegar. The pots are ranged upon a bed of spent tan procured from the tannery yards, and boarded closely over in brick-built chambers about 20 feet high. Upon the boards another layer of tan is placed with another set of pots and lead crosses, and so on for sixteen beds. Each bed may contain about 1,000 pots and three tons of lead. The tan undergoing decomposition emits the necessary heat to vapourize the ascetic acid, the presence of which with a humid atmosphere induces the oxidation of the metal and its combination with the acid forming basic acetate of lead. The carbonic acid, which is also evolved as a product of decay of the tan, acts upon the basic acetate of lead in such a manner as to abstract a portion only of the oxide of lead, forming with it white lead, and leaving neutral acetate of lead. The neutral acetate again takes up more oxide of lead, which is again separated as carbonate, the action going on from the surface inwards, so that the process is continuous, and theoretically requires sufficient acetic acid only to start it. From ten to twelve weeks are required for the corrosion of the crosses. When the operation is finished,

the corroded crosses are removed, ground through mill-stones, levigated, and finally dried in a hot-air stove, by being placed in unglazed dishes of porous earthenware, containing about 16 lbs. weight of white lead. The stoves contain from twenty to thirty tons of white lead, and these require one week to dry.

About 18,000 tons of white lead are annually made in England by this process, which, though the most ancient, furnishes a lead of greater opacity than that manufactured by the Clichy process by direct precipitation from solution.

The porcelain, Parian, and earthenware we must pass over: there is a collection of building stones from Scotland, and iron is very fully illustrated: the different sections of *rails* used by different companies may here be usefully consulted. The clays, and what they produce, figure in the collection; and woods have not been overlooked. We have probably said enough already, however, to justify our recommendation of Dr. Price's Technological Collection at the Crystal Palace.

MAIN DRAINAGE OF THE METROPOLIS.

THE REPORT OF MESSRS. BIDDER, HAWKSLEY, AND BAZALGETTE.

A LATE distinguished man and university professor of modern history—asked why he of all qualified persons had never attempted the history of England—replied to the effect that he held back from the very knowledge that he had, of the existence of documents and authorities which it would absorb his whole life-time to read through, as preparatory labour. We are tending to a like view of a very different subject. The literature of metropolitan drainage grows and accumulates too rapidly for the proper digestion of it in the time allowed by the pressure itself, of the question of public health; and when we have gone through all that has been said on the matter that may seem applicable to London, chances are that the condition of other populous districts—such as we have lately noticed—will not have received that equal and collateral attention which is necessary to the settlement of a principle—a "logical solution" of the difficulty—applicable universally, or modifiable by local conditions in details exceptional but defined. Such a principle fixed upon, will offer the only permanent mode of relief for London: all schemes yet suggested, leave us still too much under apprehension of having to commence work again, under fresh exigencies, within some small number of years.

When we took up the ponderous volume that came from the hands of Captain Galton and Messrs. Simpson and Blackwell, we broadly hinted at regret that the Referees had been induced to hurry their report—more with regard to the time of closing a session of Parliament, than to the due use of their *data*, and the formation of matured opinions. Every subsequent incident of the controversy between the Metropolitan Board and the Government Office of Works has corroborated that idea; whilst independent statements published, and opinions expressed, during the interval, have introduced new elements into the question deserving to be listened to, or refuted, and affecting the first principles of action—even those sought to be established by the main clauses of the Act of Parliament. We recognise, indeed, progress towards truth; but, if the horizon is cleared, some cherished doctrines have been shaken in a manner which we only hope will introduce no bitterness into the discussion. We have all much to unlearn, whether taking a popular or a professional view of the subject of sewerage.

The scheme of the Government Referees has been amended and re-amended, and modified in the most important features of the proposed outfall channels, at various dates. Drs. Barnes and Odling, and others, and now Dr. Letheby, have put forward statements which are of the utmost importance, both in corroboration of and in deduction from the conclusions of Dr. Hofmann and Mr. Witt and others, on which those of the Referees were to great extent grounded. Some of these views relate to the actual state of the Thames, and the operation of the water upon the sewage, and others refer to the results of the lime process for deodorizing. Also during the interval, subsequent to the Referees' report, has appeared Mr. Gurney's report to the First Commissioner of Works on the state of the Thames in the neighbourhood of the Houses of Parliament, in which again many current views as to the condition of the sewage in the river are inquired into. Mr. Haywood has reported in favour of the discharge of the whole of the outlets of the city sewers by culverts below the low-water line,—though probably regarding the measure only as a temporary one; whilst the Metropolitan Board, on the motion of Mr. Cubitt, and under the advice of Mr. Bazalgette, have decided upon certain works of the same character. We need only remind our readers that it has been urged that the ejection of the sewage by numerous small outlets into the river, would entail less evil than the collection of it into large intercepting sewers,—as to which we have ourselves dwelt upon the necessity of attention to the ventilation, as a prominent branch of the whole question, in the event of decision in favour of such sewers,—whilst, even, it has been advanced that with the extension of the outlets, along with certain measures otherwise required for the improvement of the river, no other works, such as those of the proposed arterial drainage, would be wanted. The Referees, however, may be considered to have settled the necessity of intercepting sewers, unless the low-level districts are proposed to be cleared of habitations. Mr. Haywood has now presented to the City Commissioners, a long and able report upon the question of ventilation, wherein he treats the demand for the complete removal of exhalations as imperative, and recommends that efforts should be made through the agency of furnaces and chimney-shafts, as offering the best chance of success.

We have now before us the latest addition to this body of facts and arguments, in the "Report to the Metropolitan Board of Works, upon the Main Drainage of the Metropolis, presented by Messrs. Bidder, Hawksley, and Bazalgette, in accordance with a Resolution of the Board, dated 23rd November, 1857," and which was laid before the Board last week. The documents are hardly yet complete, and certain maps and tables of gaugings, with some additions to the Appendix relative to the cost of deodorisation and other matters, are wanting in the early copy with which we have been favoured. We shall be able to understand, however, the precise nature of the views and conclusions that are embodied.

The Report and Appendix extend to over 130 pages; and they are to be illustrated by seven maps and diagrams. The first map will show the "Area of the Metropolis, as fixed by Act of Parliament, = 117 square miles;" and the "Additional area for which provision is proposed to be made by the Government Referees = 236¼ square miles;" and the second, the variations in "the three designs" of the Government Referees, in respect of route of their outfall sewers. The third and fourth plates will give the longitudinal sections of the same sewers according to the "three designs;" the fifth illustration will have "Sections of River Thames and Higham Creek, at outlet of Government Referees' Outfall Sewer;" the sixth, "Diagrams, showing the variations in the the designs supplied, in respect of level, size, and form;" and the seventh plate, a "Diagram, purporting to show the results of experiments made with floats in the River Thames, above and below Barking Creek," and which last will exemplify the extent of certain errors alleged in the present Report, in the results, as shown in the diagram of the Referees, where the mere change in the direction of the floats is assumed as identical with the reach of the tide, so as to involve, as we understand the statement, errors of sometimes as much as seven miles in a single tide.

The present Report (dated April 6th), after some preliminary observations and a succinct view of the "Recent History" of the London Main Drainage question, enters into an "Examination of the Report of the Government Referees upon the Outfall Sewers," the bulk thereof being divided into heads of "The Outfall Sewers," and "The Reservoirs," each of which subjects again is treated of as according to each of the "three plans" of the Referees. The general estimates are also considered. The other sections of the Report comprise the heads,—"General Observations upon the Sewage and Rainfall;" "Area to be drained;" "Condition of the River;" "Internal Drainage;" "Outfalls proposed by us;" "Expense of other Outfalls,"—*i. e.* "1. To the points called B*," and "2. To points of outfall midway in Sea-reach;" and, lastly, "Conclusions." In the Appendix, amongst other matter, we find a report by Mr. John Oakley, land-agent and valuer, as to the property affected by the outfall sewers, and the compensation for it; a report by Dr. Letheby, "On Chemical and Sanitary Inquiries" &c. to which are added analyses of the Thames water at Greenwich at high and low tides, by Dr. Odling, with his opinions; and a "Table of the Amounts of dissolved and suspended Matters, and of combined Sulphuric Acid in Thames Water at different Parts of its Course," &c.; with particulars and opinions as to the effect of the Thames on the health of persons likely to be affected by emanations from it; a table showing the composition of the water in the docks, and sundry tables referring to the composition of the sewage, as well as to the effects of the lime process of treatment; and "check estimates" of the cost of the Referees' outfalls.

At the outset, the Reporters assume the adoption of a system of main intercepting drainage, as "already determined upon," and that the Metropolitan Board has decided, "upon principles of which no one can doubt the correctness," that such drainage, "shall, as far as practicable, be carried out by lines of arterial sewers, running parallel with the river Thames, on both sides of the river." They, therefore, regard themselves as "not now called upon to consider the merits of the many ingenious inventions and plausible proposals that have at various times been submitted to the public." It should be recollected, however, that such schemes occupied no small space in last year's "blue book." The points remaining to be settled, they say, are,—the area to be drained; the amount of sewage and rainfall to be provided for; the dimensions of the sewers; the points of outfall, and the modes of reaching them; and the possibility of purifying and improving the river.

The short review of the history of the question, traces it from the consolidation in 1847 of the eight districts, down through the leading incidents of the reign of the six commissions which succeeded, one after another, up to January, 1856, when the Local Management Act came into operation, and thenceforward continues it; and had we space to give the story, supplying the omissions of the present account, we should now probably surprise even those who heard particulars as the events transpired. It might then be seen both, how much must have been "unlearned" to allow of the present prospect in the question, taking it as presented to the public; and, on the other hand, what must have been the injustice of the clamour under which one commission at least succumbed, merely from asserting in effect that with the volume of the Thames, the sewage, if once placed there, must be so far diluted as to render injurious consequences from that source at least, extremely doubtful. We are not, indeed, just now stating our own opinion; but we advert to the circumstance that with the view taken by the commission, one expressed in the Report before us, to which we shall further allude, appears to be accordant; whilst we find a good and independent authority, Mr. Gurney, (of whose Report it is curious to see no use made in the present Report,) stating that, if certain measures which he recommends, and which, it seems to us, are not very dissimilar to those advised by others, were carried out, "a question would probably arise as to whether any drainage of London, beyond the natural outcast power of the river, would ever be required." If this be so, and if the ground taken in the Report before us, in several main points be correct, what becomes of the chief difficulty and cause of delay, the *entire* removal of the sewage from the river? We long since argued that if the Referees were correct in their reasons for taking in so large an area, the same reasons would require them to go much further, and to intercept sewage from the Thames and its tributaries in every part of the course. But we are anticipating the Report. This document, as already stated, assumes the principle of interception; and, in the main, it is a report in favour of the scheme of the engineer of the Board of Works. But its incidental matter is as important as its "conclusions."

Thus, it appears to prove the paramount importance of the Thames embankment, to the removal of the sewage and the purification of the river. It treats the mud banks as the cause of the offensiveness of the Thames. Their influence had been noted by the Referees, but hardly placed in the first light, though Dr. Hofmann and Mr. Witt had spoken of the *mud* deposit as "*by far the most serious evil* which results from the discharge of the London sewage into the Thames." It dwells upon the fact of the purifying process which is constantly going forward in streams, and without which, the Thames, having received the sewage of towns in the upper part of its course, could not be so pure as we find it—say at Hampton—or pure as it even is after having received the sewage of Kingston and Richmond. It is argued, as often heretofore, that it is impossible that the Thames could be made at all times "a perfectly pellucid stream by the diversion of the drainage;" that within the metropolis, "the Thames never could have been a 'silvery' stream;" and that "if every particle of sewage were removed," "the Thames, as it now exists, with its rapid tide and its enor-

mous traffic, must still remain a muddy water;" and further on, the report speaks of "the production of a clear or sensibly purified stream, in and near the metropolis," as "a hopeless task," unless some powerful ruler should in a future age determine to "improve the appearance of the river at the expense of its commerce, by damming back the tide at Greenwich or Woolwich." Even this latter measure has been advocated by some parties, as our readers may know.

The mischief of the sewage after emission from the sewers, arises from the banks, where it is deposited, and will be, to a certain extent, retained, so long as they exist,—especially, of course, when the stream is low, as in hot weather. River water is an agent of purification. There is an exception to this, however, in the case of the Thames and tidal rivers generally, and which, amongst few points in this complicated subject that we can take credit for having recognised, we do happen to have made prominent. We refer to the effect of sea-water. The Reporters say,—

"In the course of the investigations we have had occasion to make of this subject, we have been brought to the conclusion that many impurities in tidal rivers proceed not from the admixture of sewage with the river waters, but from the admixture of sea-water with land-water. The inhabitants of London are generally impressed with the opinion that the waters of the sea do not ascend within the limits of the Metropolis; and the fact would be established if experiments with solid floats were found to represent the paths taken by the particles of a fluid. This, however, is not the case. The tables we publish in our Appendix from the medical officers of the *Dreadnought* hospital ship, exhibiting the results of analyses made without any reference to our inquiries, confirmed as they are by the investigations of Dr. Letheby, most distinctly prove—

First.—That the matters held in suspension by, and dissolved in, the river waters exist in the greatest proportion at high water—that is to say, when the intermixture of sea-water over the land-water is the greatest. They are then nearly four times as abundant as at low water when the tide is returning loaded with all the mechanical and chemical impurities discharged from the sewers of London.

Second.—That, irrespective of temperature, at periods after heavy rains, when the river is most largely charged with land-waters combined with waters from the sewers, the proportion of impurity is much diminished."

On the grounds, then, afforded by their own experience, and confirmed by the experiments of Dr. Letheby and Dr. Odling,—not only "that it is extremely undesirable, in a sanitary point of view, to cause sewage matter to become intermixed with sea-water, and especially under circumstances which will occasion it to be brought up the river by the flood tide," but also that "if the sewage matter were poured into a much larger volume of fresh or freshened water in a flowing stream, it would become immediately oxygenized, and cease to exist as a noisome and offensive agent,"—the Reporters have come to "a clear and decided opinion that the remote outfalls proposed by the Referees are unnecessary for effecting the objects of the 135th section of the Metropolis Local Management Act." They say in another place,—"We are, indeed, of opinion that if the local circumstances favoured such an arrangement, it would be preferable to place the outfalls within the Metropolitan boundary rather than without it," &c. They have therefore,—

* * * "unhesitatingly selected for recommendation, as points of outfall, places situated in approachable situations as near as possible to the metropolitan boundary, and as far as possible from human habitations—Barking Creek on the north side, and Crossness Point on the south side, fulfil all the favourable conditions that are attainable on either side of the river. Both are situated in low and dreary marshes, where neither the works nor the sewage can give reasonable cause of offence to any one. Barking Creek is two miles from Woolwich, and four miles from Erith. Crossness Point is midway between the two places, and three miles from each. The mean sectional area of the river at these places is *four times as great as at London Bridge*, and the average volume of tidal water *about four hundred times as much as the volume of the sewage water to be admitted into it*. The river is fresh, or nearly so, at low water, and only moderately mixed with salts of marine origin at high water,—more so, it is true, than we could wish; but much less so than at any point lower down the river.

These now suggested points of outfall contrast favourably with the outfalls which have recently been much under discussion, and are popularly known as B* (B star). The B* outfall on the north is situated at the mouth of Rainham Creek, and on the south at a point of the river about a mile above the town of Erith."

These last points of outfall they understand were recommended to the First Commissioner of Works on conclusions from the experiments with floats, which they think erroneous,—whilst they observe that "any views that are not based upon a knowledge of the deodorising effects of air and water upon sewage, must necessarily be empirical."

Referring to several specified rivers, as "the river Soar, which quitted Leicester of inky blackness, and yet became beautifully pellucid, and full of fish and vegetation, before its arrival at Loughborough," they say,—

* * * "in all these instances, we have remarked, with wonder, the rapidity of the oxydizing process by which nature causes the disgusting feculæ of towns to become resolved into pure and inoffensive substances."

As to the mud-banks, they say,—

"Much of the mischief would no doubt be removed by the construction of sewers of interception; but this operation would not be sufficient for its entire suppression."

Whilst they—

* * * * "believe that the only certain remedy for the inconveniences thus referred to will be found, conjointly with the construction of the sewers of interception, in the construction of an embankment on either side of the river, extending ultimately from London-bridge to Chelsea reach, and of such ample breadth as shall confine the tidal waters within a channel of sufficient depth to insure the covering of the bottom even at low-water of greatest springs. We are quite sure that if the river were properly trained between vertical walls, the deposition of mud would become nearly impossible, and the scour would become so great as in a short time to establish a new depth, and a new and improved régime in the navigable channel. It would be foreign to our present duties to do more than to add, that we believe the advantages which would result from the construction of a Thames embankment would not be confined to the improvement of the sanitary condition of the river, but that, on the contrary, it would give relief to the over-crowded thoroughfares, improve the commercial value of the river frontages, afford desirable opportunities for the quiet recreation of the people on Sundays and holidays, and contribute greatly to the architectural embellishment of the metropolis."

They propose to discharge the sewage during the first three hours of ebb-tide,—though, were it not for "the possibility of reasonable objection" from "parties locally interested," they are convinced the sewage might be safely emitted at all periods. The reservoirs are proposed to be so constructed as to allow of the application of the lime process of precipitation. Of this they speak far more favourably than did the Referees. Dr. Letheby says,—

"I do not regard the process as one that completely fulfils the demand of science, or that will ever become a profitable source of speculation; but as a cheap and efficacious means of separating the insoluble matter of sewage it is certainly the best with which I am acquainted.

Judging from the experiments which I have made, and the observations of practice on a large scale, it is ascertained that about twelve grains of lime to a gallon of sewage will effect the speedy separation of all the suspended matters, and also of about one-fourth of the dissolved organic matter, leaving a clear liquor which has lost a great part of its offensive odour; and when the clear liquor is mixed with from five to seven times its bulk of water, and is exposed to the air, it is no longer offensive. This I have demonstrated by experiment, and my results are entirely at variance with the hypothetical conclusions of the Government referees."

And—

"I do not at all agree with the opinion expressed by Dr. Hofmann and Mr. Witt, in the concluding paragraph of their report, namely, that the clear water from the sewage deposit might give rise to the most offensive and dangerous effluvia, and might seriously affect the river; and that the erection of works in the immediate neighbourhood of the metropolis for the deodorization of the London sewage, might prove very prejudicial to the health and comfort of the inhabitants of London; for, apart from the fact that these opinions are altogether unsupported by any acquaintance with pathology, or hygiene, but are merely based upon abstract chemical hypothesis, there is the positive and incontrovertible fact, that such works have been established for years, not only without the least prejudice to health, but with the greatest advantage to the public—and so, again, as I have already shown, the clear water which runs from the sewage deposit has *not* been found to have an injurious influence upon the streams into which it flows, or to be a source of offensive or dangerous effluvia."

With this view Dr. Odling agrees; but it should be well looked into, seeing that it goes beyond the Report of Mr. Austin on the branch of the subject in question. We can only quote further from Dr. Letheby's Report, the following, on an interesting point before dwelt upon:—

"Now experience has shown that whenever putrefying organic matter comes into contact with soluble sulphates, it decomposes them, and causes the evolution of sulphuretted hydrogen. 'In hot climates, as on the coast of Africa, where the water of the rivers, highly charged with organic matter, mixes with the sea-water which contains sulphuric acid, the same decomposition takes place—extending sometimes to a distance of twenty-seven miles from the mouths of the rivers' (Gmelin); and, according to Dr. Daniell, the miasm which is thus produced is the cause of the malignant fevers which are common to the African coast. The same miasm is produced even upon our own coast when sea-water mixes with fresh water charged with putrefying organic matter; and this will account for the almost intolerable nuisance which is experienced wherever the sewers of a town discharge themselves into the sea."

The Report of Messrs. Bidder, Hawksley, and Bazalgette, winds up with the following—

CONCLUSIONS.

First, as to the Condition of the River.

That the causes of the apparent impurity of the river have been greatly exaggerated, and much misunderstood; we find:—

1. That the mechanical discolouration of the water is not due to the presence of sewage matter, but chiefly to the presence of inorganic substances, brought down by land floods, or washed up and kept in motion by the tide.

2. That the chemical condition of the flowing water is not sensibly altered by the admission of sewage, because the organic matters become rapidly decomposed and disinfected by the action of the oxygen contained in the water through which they are diffused.

3. That mud containing much organic matter, derived in great measure from the sewage discharged above low-water mark, is deposited on the foreshores of the river, and there putrefies.

4. That the condition of the flowing water of the river is not injurious to health; but—

5. That the condition of the stagnant mud is injurious to health.

6. That the offensive matters deposited with the inorganic mud are principally derived from the metropolitan sewers, and not, to an appreciable extent, from any more distant sources.

7. That the discharge into the river of comparatively small quantities of sewage matter from areas difficult to drain to any common outfall, may be continued *by outlets extended to low water*, without any sensible injury to the appearance of the river or its banks, or any detriment to the health of the inhabitants of the metropolis.

8. That the proper remedies for the evils arising from the present state of the river are two:—

1st. The interception of the greater part of the sewage of the metropolis above the present outlets, and its removal to, and discharge at, parts of the river below London, where its presence will be harmless.

2nd. The construction of terrace embankments on both sides of the Thames to confine the tidal channel, accelerate the stream, and prevent the exposure of the bed and banks of the river.

Secondly, as to the Scheme submitted by the Government Referees.

That the plan recommended by the Referees is needlessly large, excessively costly, and, as a work of construction, all but impracticable; we consider it especially objectionable in the following particulars:—

1. Because the amount of rain-flow proposed to be carried off (two-fifths of an inch in eight hours, or six-fifths of an inch in twenty-four hours), is much greater than is requisite for the *reasonable* purification of the river.

2. Because the internal sewers necessary for the reception of the above amount of rain-flow would be extremely difficult to construct under the streets and buildings of the metropolis, and would entail much loss and inconvenience to the inhabitants.

3. Because, although the peculiar arrangements of the Referees have been professedly made with a view to insure the dilution of the sewage to the extent of six times its maximum flow, yet that many of the most populous parts of the metropolis in which the largest amount of dilution is necessary, are proposed to be provided for to only a much smaller extent.

4. Because, with the object of increasing the extent of the gravitating area, the Referees have adopted lower levels and smaller inclinations than are in practice found to be advantageous.

5. Because no means are suggested for obtaining the stated amount of dilution *within* the metropolis (but only *without* the metropolis), although rainfalls of the amount necessary for cleansing the enlarged sewers will occur only at distant intervals.

6. Because the outfall channels are of enormous size, and would be extremely difficult and expensive to construct in the stated situations, and at the stated levels.

7. Because the outfall channels commence at 3 feet and 4 feet respectively below *low-water* mark, and discharge at 15 feet and 16 feet respectively below *low-water* mark, and consequently cannot be drained off.

8. Because these drowned channels and their open outfalls will accumulate deposits which it will be extremely difficult, and very expensive, to remove.

9. Because the water to be applied for the dilution of the outfall channels will re-act on the internal drainage, and pen it back to its own level.

10. Because the cost of the proposed works will, upon any one of the three plans, very greatly exceed the amount at which they are estimated by the Referees, the probable cost of the smallest project being upwards of 9,000,000*l*.

Thirdly, as to the Scheme of the Metropolitan Board.

That the plan already adopted by the Board, with the modifications hereafter mentioned, is adequate to the satisfactory drainage of the metropolis, and the reasonable purification of the river and its banks, and is also capable off effecting the following improvements, and of affording the following facilities:—

1. The removal of the maximum sewage water of three and a half millions of people.

2. The removal, in six hours of maximum sewage-flow, of a rain-flow equivalent to one-fourth of an inch per diem (produced by a rainfall of four-tenths of an inch per diem) from the area to become hereafter occupied by the above amount of population.

3. The relief of the low-lying districts from the effects of ordinary floods and tide-locking.

4. The delivery of the sewage and rainflow at points on the river where they will not be injurious to the health of the inhabitants of London, or of the population residing on the banks of the Thames, or be prejudicial to navigation.

5. The substitution of covered sewers for several of the existing open sewers.

6. The construction of the works at a reasonable cost (2,300,000*l*.), and in a reasonable period of time (five years).

7. Facilities for treating the sewage with lime or other chemical agents, with a view to its defecation before admission into the river, or to the realisation of its fertilizing contents, if such should ever become commercially valuable.

8. Facilities for discharging the sewage at any (the most desirable) period of the tide, and for securing its transmission in an innocuous condition to the sea.

Fourthly.—The modifications we recommend for more perfectly effecting the foregoing and other objects, are chiefly the following:—

1. That the Northern Outfall Channel shall discharge at Barking Creek, in preference to any lower part of the river.

2. That the Southern Outfall Channel shall, for the purpose of more completely complying with the intentions of the Metropolis Local Management Act, and without, at the same time, giving just cause of offence to the inhabitants of Woolwich and Erith, discharge into the river near Crossness Point; although, in our opinion, a situation equally eligible in every practical point of view, presents itself in Greenwich marshes, near the terminus of the branch line of the North Kent Railway.

3. That covered reservoirs of moderate size be formed near each outlet, for the reception of the sewage water, until it shall be discharged during the first hours of the descending tide, or to enable it to be defecated by lime or other chemical agent.

4. That the northern outfall sewer be constructed in brickwork rather than in iron, as designed by your engineer, and that a carriage road of 40 feet in width be formed over it.

5. That the dimensions of the southern outfall sewer be somewhat increased in size, for the purpose of adding about 4,000 feet per minute to its capability of discharge.

6. That the outfalls of the few outlying sewers which cannot be reasonably brought within the major scheme, be advanced into the river, so as to discharge below low-water mark.

And finally, we beg to express our earnest conviction that, as regards the north side, the middle and high level sewers should be first proceeded with, not only for the more speedy relief of the low-lying districts from floods, but also to afford time for a determination to be come to with respect to the suggested formation of a Thames embankment in connection with the construction of the northern low level sewer."

We have not noticed one or two matters which would call for further consideration. But, the Report deserves to be commended to attentive perusal; and, with that expected from the Sewage Commission, said to be at press, may remove some erroneous views, and will help to the settlement of the subject.

CONGRESS OF DELEGATES OF LEARNED SOCIETIES AT PARIS.

THIS meeting, held annually at Paris under the direction of the Institute of the French Provinces, assembled on the 5th instant at the Palais de la Société d'Encouragement.

Mons. de Caumont, the president, opened the proceedings. In the course of his address he gave a *résumé* of the various provincial meetings of the Institute, known as *Assises Scientifiques*, and alluding to the extension of its beneficial influences, stated that meetings were already organized to be held in twelve towns during the present year.

A peculiar feature in this Institute is that it includes within the circle of its operations the different branches of physical and natural science, agriculture, history, archæology, and the fine arts; allusion to which was thus made in a letter from the great Humboldt, one of the members, read by the president to the meeting:—"You were inspired, my dear *confrère*, with a patriotic and a felicitous idea, when you laid the foundation of this noble institution, comprehending, as it does, in a single grasp, so many elements scattered over the varied surface of France."

A subject which occupied largely the attention of the congress was the architectual and archæological, or, more strictly speaking, epigraphic remains in France; their importance as historical evidences; the necessity for their preservation; the mode by which that preservation shall best be effected; and the question as to whether it ought to be carried out by the Government or be left to the care of learned societies and individual enterprise.

Out of seven questions set down in the programme of the congress, coming under the head of Archæology, History, and the Fine Arts, four bear directly upon this point.

But we shall not enter upon them now, as we propose in our next number to give some details respecting such portions of the transactions of the congress, which only terminated its sittings on Thursday last, as are likely to be acceptable to our readers. We shall conclude the present brief notice with an account of a discovery lately made at Bayeux, which, independently of its importance in an archæological point of view, cannot fail to possess a certain historical interest for Englishmen.

Mons. le Vicomte de Cussy drew the attention of the congress to the discovery, within the last three months, of two ancient capitals in the cathedral of Bayeux. It is known that the original cathedral, of which the crypt alone remains, was built by Odo, bishop of Bayeux, brother to William the Conqueror, and was consecrated in the presence of that king and his wife Matilda in 1077.

These fine fragments had been used as ordinary materials at the time of the restoration of this cathedral at a subsequent period, and were brought to light within the period named during the removal of the walls supporting the cupola.

The capitals are thus described. They are of Caen stone, with the ground painted red. Upon one a divine personage, richly clothed, is seated in the centre, surmounted by a double glory. His right arm is raised, with the hand extended, and the palm presented. On his right thigh he supports a child unclothed, and distinguished by no particular characteristics; while in his left hand he seems to hold the little spirit, which he presses to his breast. On the right are figures of seraphim.

Upon the other capital the same divine personage is represented standing, the right arm extended, with the hand as in the first. The left arm is mutilated. The attitude is that of the Redeemer, as exhibited on many monuments in the north of France. On the right is St. Paul, holding in his left hand a sword, of which the hilt alone remains. He wears an ample cloak, which drapes his right arm. On the left is St. Peter, who occupies (according to modern ideas on the subject), but a secondary place. The keys, cut through, are of remarkable proportions. With his right hand he points to his Master.

M. de Cussy is of opinion that the sculptor has here represented the spirit of the Saviour received by the Heavenly Father, at the moment of His expiration on the cross, and believes the execution to be contemporaneous with a very similar work in Westphalia, long considered to be of the Carlovingian era, but to which Massman has affixed the exact date of 1119, or forty-two years after the consecration of the cathedral of Bayeux.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

PRESENTATION OF MEDALS.

ON Monday, the 12th inst. a meeting of the members was held in the rooms in Grosvenor-street, the Right Hon. Earl de Grey, president, in the chair.

On the name of Dr. Petrie, of Dublin, being proposed as hon. member,—

Mr. Digby Wyatt said the name of Dr. Petrie would be familiar to the members of the Institute in connection with his celebrated work on Irish Antiquities, his illustrations of the Round Towers of Ireland, and his profound knowledge of the archæology of that country. He would also take that opportunity of calling the attention of the Institute to the great loss the Institute, and, indeed, all England, had sustained in the death of Mr. Herbert Minton, one of their hon. members. It would be superfluous to dwell upon his merits as the first English art manufacturer to whom we were indebted for a vast advance in ceramic manufacture, and for bringing that beautiful art to bear on the labours and profession of the architect. His revived manufacture of encaustic tiles; his general improvement in porcelain; the application to lithography, so as to supersede the hard lines that formerly existed in china, together with the distinction he attained at the Great Exhibition in 1851 and more recently in Paris, were all alike most honourable to himself and to the English nation, as tending to show how our manufacturers, unassisted by Government aid, could fairly compete in all the ordinary supplies of common wants with the more distinctly protected establishments of foreign countries.

Mr. C. C. Nelson, hon. secretary, announced the receipt, amongst divers other donations, of photographs of some drawings of buildings at Bhurtpore, by the East-India Company; and of a series of twelve plates from Mr. Garling, Fellow, of Ancient Rome, published in 1561 and 1773.

Professor Donaldson observed that these representations of Rome were published when the study of antiquities was at its height, and were founded on ancient medals and authors.

Mr. Nelson regretted to announce the decease of Dr. Lang, one of their honorary fellows, and called attention to some carvings in wood sent by Mr. Rogers.——Mr. Wyatt presented a lithographic portrait of the president, Earl de Grey. ——Thanks having been given to the various donors, the Honorary Secretary said that the deputation from the Institute had waited on Lord John Manners, her Majesty's first commissioner of works and public buildings, and on General Peel, and brought before them the memorial that had been adopted at the last meeting. Lord John Manners and General Peel gave the greatest attention to the memorial and to the representations of the speakers, promising that every attention should be given to the subject, and hopes were held out of a more satisfactory result than had hitherto attended the subject.

The noble chairman said it now became his pleasing duty to proceed with the presentation of the prizes awarded by the Council of the Institute. The first name was that of Mr. Blake, to whom a silver medal and five guineas had been awarded for his illustrative description of Kilconnel Castle, Ireland. He (the noble lord) had not had an opportunity of seeing Mr. Blake's production, but felt quite confident in the propriety of the award made by the Council; and he felt all the greater gratification in giving the medal, from being reminded of the fact that this was not the first occasion on which Mr. Blake had received a prize from the Institute. It often so happened that a man might obtain a minor prize in his profession, and when first starting in life, with which his aspiring spirit did not rest contented. He was honestly and honourably dissatisfied with it, and this induced him to make a further, and yet more successful effort, which resulted, as in the present case, in the presentation of a second prize, which had on this occasion been awarded by the Institute with great impartiality and good will to a gentleman in their own profession from Ireland, who had no direct connection with the Institute, showing that no personal feeling or partiality actuated the Council in their award; and he (the chairman) only hoped that, once in every year, he should have the pleasure of distributing prizes on a similar principle among the various aspirants to fame, favour, and future prosperity in the profession. Mr. Blake had rendered a valuable service to the architectural antiquities of Ireland, and he trusted that he would long successfully pursue the cultivation of the profession and architectural peculiarities of his native country.

Mr. Blake having received the prize amid applause,

The noble lord again rose for the purpose of presenting to Mr. D. Paton Low, the Soane medallion, for his design of a marine sanitarium, and congratulated that gentleman (who, owing to inattention to a particular point, did not receive a prize on a previous occasion), on its acquisition on the present.

Mr. Low acknowledged the gift, and said it would, he hoped, be a stepping-stone to greater endeavours, and yet higher honours.

A medal of merit was also presented to Mr. Fuller, and one to Mr. Kempson (who was not present), for the second and third best designs for a similar sanitarium.

His lordship then said that the next prize, that of the Royal gold medal, given by her Majesty, was one he always felt the greatest pride and pleasure in presenting. He did not know whether there were other institutions of a kindred character that participated in similar proofs of her Majesty's kindness, and recognition of the objects the Institute had in view; but her Majesty and the Prince Consort had always shown the greatest readiness, willingness, and kindness in promoting the objects of their honourable and privileged Institute. The honour of conferring a Royal gold medal was one which was now conferred very sparingly, and was in consequence to be looked upon as a mark of high distinction. No one, moreover, could lay claim to it: it was the impartial award of the Institute, and the recipient of it was often not aware that his name had been considered. The object the Institute had in view in the distribution of these medals was to promote the progress of architecture and art, thereby holding out an incentive, and a stimulus to the attainment of still higher perfection and achievement among all ranks, nations, and people; and if one thing was more remarkable than another, from the earliest foundation of these prizes, it was the fact of their general distribution with so much impartiality and public satisfaction. It might naturally be supposed that an English Institute, in awarding gold medals from an English Queen, would bestow them on English architects. This would undoubtedly be the natural notion of all those who had embarked in the pursuit of an arduous profession requiring a knowledge of art and science, and the possession of industry, intelligence, and integrity; and it might on the first blush appear hard, and in some degree unjust, that where a prize was given by a British sovereign, British architects alone should not be the exclusive participators; but he (the noble lord) considered that the circumstance of its being given elsewhere periodically was one of the greatest proofs of its universal advantage. For his own part, as president, he had great pleasure in giving the prize to gentlemen who had no connection with this country. Last year, if he remembered rightly, they gave the prize to an English architect, having already given it to a French, an Italian, and a Bavarian architect, and now they were about to present it to M. Stüler, a Prussian architect. He (the chairman) had been in Berlin, but it would be presumptuous on his part to express any critical opinion on the noble architectural works of that great capital; but when he found men in this country in the highest position in their profession uniting in the conclusion that the gold medal was justly awardable to M. Stüler, he could not help feeling that he justly deserved it. The honour conferred reflected equal credit, no less on those who gave it than on him who received it, in view more emphatically of the tender ties and renewed relationships that had recently taken place between the kingdom of Prussia and Great Britain. He only hoped that the same feeling of esteem and kind spirit that

had induced the highest names in the architectural profession of this country to confer the gold medal on one of the distinguished confraternity of a foreign country would be long continued between all ranks of the two nations, whether in arms, in arts, in science, or in song, and that their alliance would be as perpetual as it was illustrious. (The sentiments expressed by the noble earl were re-echoed by the meeting in applause.)

The Prussian Consul-General (M. Hubner) returned thanks on behalf of M. Stüler and the government he represented; adding that his Majesty the King of Prussia had only recently, through the mediation of M. Stüler, caused two gold medals to be sent to England, to be awarded to English architects connected with church-building societies. He did not know if they had been awarded yet; but it was a strong proof that the King of Prussia was as heartily and cordially disposed towards the architects of England as the latter were towards the architects of Prussia.

The noble Earl thought the meeting would express their gratification conjointly with himself at the coincidence that had occurred on this occasion in their having the unprecedented pleasure of presenting a prize to a Prussian architect, an Irish architect, a Scottish architect, and to an architect who could not be presented because he lived in Wales. No stronger illustration could be afforded of the impartial manner in which the Royal Institute of British Architects bestowed its honours on all who deserved them.

Professor Cockerell, R.A. then read "Some Remarks on the old Vatican Basilica, and its Conformity to the Christian Rules of Building known to us of subsequent Date,"—setting forth, in fact, the use made by the Mediæval architects of the equilateral triangle and the *vesica piscis* in designing, as illustrated by *Cæsare Cesariano*. We shall return to the professor's paper. Most of our readers know the essay by Kerrick on the use of the *vesica piscis*, in the "Archæologia" for 1821, and that the investigation has been carried much further since by Mr. Griffith and others.

The thanks of the meeting were given to the professor for his communication, and the meeting was adjourned to April 26.

THE GREAT BELL OF WESTMINSTER.

The great bell of Westminster was recast at Mr. Mears's foundry, in Whitechapel, last Saturday evening. It is yet to be seen whether or not the operation was successful. We are told that hot air was blown into the mould all the day, as required by the contract, and that there was an ample dead head of metal on the top of the casting. The bell will have to remain in the pit for a fortnight to cool; so that nothing can be known with certainty of its note or quality for some time yet. So much has been said of the failure of the former bell, that it is only due to Messrs. Warner to state that similar misfortunes are by no means uncommon, both in this country and abroad. The great bell of Montreal, the largest ever made here before Big Ben, was cracked in its first year. The St. Paul's bell was cracked, and had to be recast twice, even in Sir Christopher Wren's time; and the still more famous bell of Notre Dame, at Paris, was cast no less than three times over between the years 1680 and 1686, before a satisfactory result was obtained. The sooner the bells of Oxford and York share the same fate the better, as they are both obviously defective: the former so much so, that it has been doubted whether it is not really cracked somewhere already; and the latter is almost disused.

THE INAUGURATION IN PARIS OF THE NEW BOULEVARD DE SEBASTOPOL.

On the 5th inst. was witnessed in Paris the ceremony of inaugurating a new street, called the Boulevard de Sébastopol, commencing from the right bank of the river Seine, and extending from the Place du Châtelet to the Boulevard St. Denis, affording a very long line of communication. It is a gratifying result of one of the many works recently accomplished in the city. It is of a noble length and width, rivalling, if not surpassing, some of the old boulevards between the church of La Madeleine and the column erected on the site of the Bastille. It is bordered with houses, which, whatever objection prejudice may raise against the French manner of taste, are models of street architecture. The street is planted with trees along its entire length on either side: it is paved with asphalte, and well macadamised. It cannot be denied that the French architects sometimes succeed admirably in combining the useful with the ornamental; a result, however, that is not obtained without some effort, and the co-operation of different departments of art to one end. In viewing the public buildings of Paris, and in walking along the streets, no visitor whose mind is open to receive impressions from such objects can fail to admire the general character of the street architecture of the present epoch, and the improvement made in it since the last few years. At present, as some instances of this fact, we shall merely mention the general use of good marble and stone, marble especially, which is got from the environs of Paris; the excellent limes; the practice of working the ornaments from the blocks left as an integral part of the building and of the size required for that purpose, but not worked in a shed or apart from the buildings they are intended to decorate; the sound construction; the rapidity with which they build, and yet the necessary rest they give to these works under certain temperatures; the precautions against fire, and the means adopted to escape from it; the ornaments which the chimneys become, rising with dignity to a considerable height —higher than, or as high as, the steep Mansart or similar roofs, which are always made a conspicuous, instead of being a concealed feature, in their edifices, and which, with bold, tall, and projecting dormer windows, remind us of the works of the early architects of the Louvre and the ancient *châteaux* of France.

The ceremony of opening a new street, which has caused the disappearance of nests of dirty, unhealthy, and inconvenient houses, is hailed by the Parisian population with enthusiasm. The new Boulevard de Sébastopol is certainly another embellishment to the capital; and it is not every day that one of such importance, and of such extent, is the scene of rejoicing and pomp that took place on the 5th. Venetian masts were erected on each side at regular distances, from which waved national banners, bearing figures or inscriptions, the tri-coloured flags, and other hangings of scarlet or green, with the initial and crown of Napoleon III. encircled by a wreath; as also escutcheons bearing the arms of the emperor, and the mural crown of the city of Paris. The different regiments garrisoned in Paris marched to the sounds of the music of different bands, and formed two ranks along each side of the Boulevard, preserving a clear road for the imperial *cortége*. But, before this arrived, there was a procession, consisting, first, of the firemen, then a body of the *gendarmerie*, the *Chasseurs-à-pied*, detachments of Lancers, the National Guard, the Infantry, the Grenadiers; and, while the troops were under arms, and the way cleared for the generals who gave orders, and for the expected emperor and his retinue,—the fine horses, the beautiful costumes, and the glitter of arms and colours, all heightened by a sun that shone bright during the ceremony, afforded sufficient to feast the eyes and prevent among the bystanders any sensations of *ennui*. At two o'clock the distinguished personages forming the chief attraction of the procession left the Tuileries, and entered the Boulevard from the Place du Châtelet. The emperor rode on horseback at the head of the marshals, commander-in-chief of the army in Paris, generals, officers, admirals, and ministers of his court. The empress was in an open carriage, accompanied by the Princess Matilda, and came after the emperor: she was preceded and followed by a detachment of a hundred lancers of the guard. The crowd of persons of all ages and classes assembled to witness this day's spectacle was immense: it may be said that all Paris was out to see the *fête*: great numbers stood to see it from the roofs, the balconies, windows, and the scaffolding where not removed from some of the houses. All showed themselves very eager to catch a glance at the passing pageant. Their cries of "*Vive l'Empereur! Vive l'Impératrice!*" were very enthusiastic. At half-past two, at the moment the *cortége* approached the Boulevard St. Denis, an immense drapery of gold, worked with stars and garlands of flowers, which was lowered during the ceremony, was drawn up like a drop-scene in a theatre. It was suspended from Moorish columns, upon the pedestals of which were represented some allegorical figures of the arts, the sciences, commerce, and peace. From the top of the light towers (decorated with Arabesque ornaments, which they supported), the eye could take in the long perspective of the new boulevard, with its multitudes, extending from the Eastern Railway station to the River Seine. A few minutes more, and the emperor received at the station the ministers and the municipal council, the architect of the new plan of Paris, the engineer of the bridges and highways; and the ceremony terminated with brilliant gas illuminations in the evening. F. L.

THE BRITISH MUSEUM READING-ROOM.

AUTHORSHIP OF THE DESIGN.

With reference to your article of last Saturday, on the new reading-room and libraries, I beg to observe that Mr. Hosking suggested a massive building for the exhibition of sculpture, but no accommodation for readers or books; whereas, the structure which I suggested, and that has been built, was intended, and is used, solely, for readers and books. His scheme included quadrilateral halls, central halls, ample staircases, corridors, &c. all of the usual materials; the building which I suggested and have seen carried out, is original and unique in plan, use of materials, arrangement, and construction. Mr. Hosking says (p. 4) that it is not the plan of the Pantheon that he claims, "but the application of its form, disposition, and proportions," and the plagiarism he alleges, is the application of such his device, with certain of his combinations, contrary to honour and good faith, not only on my part, but also on that of the trustees. It will be obvious to any one who will come and inspect the building that neither the form, nor the disposition, nor the proportions of the Pantheon, have been adopted in the new building at the Museum. There is no resemblance whatever between the architectural features of the two schemes. Mr. Hosking proposed a reduced Pantheon,—a cupola 120 feet in height, and the same in diameter. The cupola of the reading-room is 140 feet in diameter, and 106 feet in height. Are these two conceptions alike? If you, Mr. Editor, will come here and point out in the new building any single part suggested in Mr. Hosking's plan, I am ready to admit his claim to the whole.

I should not have noticed Mr. Hosking's publication, if you had not; nor should I add a word to the above, if Mr. Hosking had not so far forgotten himself as to accuse me of untruthfulness.

Mr. Hosking states that, on the 14th of June, 1852, he sent me a copy of the *Builder*, dated June 22, 1850, in which his scheme of building was set forth, and he goes on to say that I am a "pirate," having taken from his scheme my suggestions for building the reading-room and surrounding libraries; which suggestions I made on the 5th of May, 1852.

I distinctly aver that I did not receive that number of the *Builder* on the 14th of June, 1852, nor in any part of 1852 or 1853, and that I never knew of Mr. Hosking's plan till the latter part of 1854, when I did see, for the first time, the *Builder* of the 22nd of June, 1850.

Long after the works for the new building were begun, I found in my study at the British Museum (not at my private residence), a paper merely addressed to me, in which was carelessly wrapped up a copy of that number of the *Builder*. I showed it at once to Mr. Jones and to Mr. Fielder, as a document just received, and wondering whence it came. I learned then, for the first time, from Mr. Fielder, who Mr. Hosking was. The moment I received Mr. Hosking's letter of the 30th of April, 1857, I showed it to both those gentlemen, who recollected, immediately, my having shown them the number of the *Builder*, as I have just stated. The works for the new building were begun late in March, 1854, the contract was made some time after: I became acquainted with Mr. Fielder after the contract was made.

Mr. Hosking admits that I could not have received his paper in May, 1852, when I put forward my "first design," but is positive that I had, when I put forward "the other, early in 1854." My answer is, that I never put forward any design whatever after May, 1852. I have freely made suggestions to Mr. Smirke; he has most unreservedly consulted me from May, 1852, to the present day; but I have never made any other design than that shown by the two plans of May, 1852, accompanying my report of the 5th of that month, and printed by order of the House of Commons on the 30th of that same month.

The rashness of Mr. Hosking in making groundless statements is only equalled by his intemperate and unbecoming language. He accuses me of having made an interpolation in a letter of Mr. Smirke to him, whereas I had no such letter, nor a copy, to interpolate, as he will learn from Mr. Smirke, who will also tell him that I was perfectly justified in what I said to Lord John Russell. He gratuitously charges me with writing, or causing to be written, an article in the *Athenæum*, in which article opinions are advanced which I do not hold, and which I have repeatedly combatted. He contends that the cupola does not rest entirely on iron supports; that is, however, a fact of which he may convince himself by coming to look at the building: he avers that the maps and charts of the Royal Collection have been kept somewhere

else, and are now brought back to the King's Library from their hiding-places; the truth being, that the removal, the hiding-places, and the bringing back, are pure inventions of his own. He affirms that that library was built "for a library and reading room," a story for which there is not the slightest foundation, and which was never dreamed of by any one before.

British Museum. A. PANIZZI.

REMARKS ON CEMENT.

How many mysteries, in this our day, are presented to our notice and admiration; and whilst they enticingly invite our investigation, they lead us often into the wild regions of speculation, and leave us in the dark at last. The philosopher, with the lamp of science in his hand, in the pursuit of useful knowledge, has brought to light many facts of a startling nature, by which our race is benefited, facts which show clearly enough that certain matter, being brought into peculiar relation to other matter, will produce definite, unmistakeable results, whilst the secret mode of their operation remains yet undiscovered. Two dissimilar metals, of almost insignificant dimensions, immersed in an acid solution, silently, invisibly, and powerfully put particles of matter into motion, the effects of which, with proper conductors, are transmitted to incredible distances, in the twinkling of an eye. Here is a practical fact, now well known, but who can explain the thing fully, and reveal the why and wherefore of this strange agency. It seems as though nature drew aside the veil, so far as is necessary, to enable us to arrive at conclusions for practical utility, almost to the extent of making us proud of our discoveries, but is pleased still to conceal the explanation of the mystery, in order to keep us humble and still inquiring.

Amongst many other things of a similarly mysterious nature, that of the setting property of cements, is one which has to the present time set all explanation at defiance. This is true with regard to cements generally, but the subsequent remarks are intended to apply to that kind which now so universally obtains, and which is called "Portland."

Here, then, is a mass of powder, the particles of which lie together simply in mechanical combination, at present obeying only the law of gravitation, but possessing within themselves properties which fit them for union with another substance, and with one another. This other substance is water, having in itself no fixedness or solidity, but how marvellous is the change when these two, the powder and the water, are legitimately brought together in close companionship, a bond is established, which becomes strengthened with time ever, and can be separated in time never, otherwise than by the decomposing influence of an intense furnace.

The whole mass, by the chemical affinity of its elements for each other, is condensed into considerably less space than was originally occupied in the uncombined state. That this change takes place is obvious to every observing manipulator; but who can explain the mode of its operation, and show why the water should enter into combination with the dust, and lose its liquid form? It may be supposed by some persons that the water goes off in vapour during the process of setting, or in the subsequent drying of the cement: this, however, is not the case; the water becomes a permanent inhabitant in the mass, which can be easily proved.

Many have been the conjectures of learned and scientific men as to the cause of the hardening of cements; it still, however, remains unexplained. All that we know at present is, that by mixing a certain quantity of water with a given quantity of cement, a combination takes place, rendering the compound suitable for the purpose for which it is intended to be used; and perhaps, practically considered, this is all the explanation that is required: a future generation may be able to explain what at the present is hidden from our view.

It has been thought that the solidification of cement was due to the absorption of carbonic acid gas by the lime during the process of crystallization, as mentioned on page 172 of the *Builder* of March 13th, in the paper on cements by Mr. Burnell; but I am glad to see that that gentleman, as well as others with him, has given up that theory, because it did not coincide with some opinions that I have for a long time had on the subject of solidification, founded on experiments made, and tending to prove that the play of carbonic acid can have nothing whatever to do with it.

I have mixed Portland cement quickly, and placed it under the receiver of a good air-pump, removed the air as rapidly as possible, in order to leave the yet soft composition in a partial vacuum, so that neither the carbonic acid of the atmosphere nor its oxygen could exert any influence upon it: notwithstanding the exclusion of these, the hardening went on, the same in degree and rapidity as though it had been exposed to the external air.

When it is considered, therefore, that Portland cement hardens as well *in vacuo* as in air; as well when buried deep in the earth as when above ground; as well under water as out of water, we arrive at the conclusion that whatever may be the efficient cause of the hardening, it is not due to carbonic acid.

My object in writing this paper is to offer a few practical suggestions that peradventure may be useful to some, at least, of the readers of the *Builder* on the using of Portland cement, as requested by your correspondent, "T. L." p. 239. "T. L." says truthfully,—"It is well known that good cement, for the want of proper treatment, has been condemned as bad."

The question then is,—what is good Portland cement, and how shall the person about to make use of this article be able to prove it good or otherwise, as the case may be? Different persons have different standards of goodness, each according to his own peculiar taste. One, if it set slowly, will say it is not good; another, if it set quickly, will pronounce it bad. Now neither of these conditions is a proof of its essential goodness or badness, each being merely a circumstantial feature in it. Cement may be either quick-setting or slow-setting, and yet be very good; or it may possess either of these peculiar features, and yet be very bad.

It does appear to me, therefore, a desideratum to possess some certain rule whereby the quality of cement may be speedily ascertained; so that the manufacturer who supplies a good article may not be improperly blamed on the one hand, and that the work to be performed may not suffer in want of solidity through the using of unsuitable material on the other.

I think that the four following questions will embrace all that is necessary on the subject in hand, supposing them to be asked by a person just about to use some Portland cement supplied to him:—

First. Will it set at all, and, if so, in what time?

Second. Will it remain hard and sound after having been used, or will it crack or blow?

Third. Will it carry its proper quantity of sand?

Fourth. Will the colour be good?

The first question can be easily answered by gauging a small quantity, using as much water as is sufficient to bring it into a pasty mass, taking care that the water is well incorporated with the powder. The time of setting may range according to circumstances, from one minute to half an hour. Should the cement be very quick-setting, there is danger of "killing" it in the gauging, especially if too much is mixed at a time, and the workman does not use it immediately. By killing it is meant that the process of solidification is interfered with; that, in order to keep the mass in a workable state, after the setting has commenced, the man charged with the mixing goes on chafing it up, and probably adds more water: in this way not only has its attempt to set been frustrated, but more water has been supplied than was consistent with its requirements to insure its proper hardening. Such a compound can never be so compact and dense as it would have been, had not its setting been arrested by the remixing. Work completed with material thus treated would some time after produce appearances which would seem to indicate that the cement was bad; for instance, arrisses will be found in a crumbling condition, and small surfaces will peel off, this arising from the composition having had worked into it more water than could properly combine with it; the cement at the same time might have been good, requiring only to be mixed in smaller quantities, and used more quickly; or the cement required cooling, that it might set more slowly. I say the cement may have been very good, and it can be proved, yea or nay, thus:—Let a small quantity of the quick-setting cement be spread out, about half an inch thick, upon a sheet of iron, for a few hours; this, being a good conductor, will extract the native heat of the article. On gauging an article of this cooled stuff, it will be found quite practicable, and will set in good time. Soon after gauging, immerse such a sample in a vessel of water, and, after a few hours' immersion, take it out and examine it for soundness; for remarks on which see further on.

The next question is, will it remain hard and sound after having been used, or will it crack or blow?

This I consider is a question of great importance, and although some phases of unsoundness have been spoken of arising from unskilful manipulation, yet others remain to be noticed.

For running mouldings to cornices or architraves, or for forming projections or salient angles, and other work, where much exposed to the alternations of our climate, hot and cold, wet and dry, frost and thaw, and, as much labour and skill are usually expended on these works, it is absolutely necessary that the cement should be of that quality to resist all these vicissitudes. Whilst, however, it is true that good cement has often been spoiled by bad workmanship, it is no less true that good workmanship has been expended upon a worthless material; apparently good when used, but after a few months had elapsed, when changes of weather had produced their effect, a painful exhibition of blowing and cracking has met the eyes of the proprietor, to his great annoyance.

Now I think it is worth the taking of a little pains, before commencing an important job, to ascertain whether the cement supplied is of the required character or not; and this is by no means difficult of accomplishment, for that which takes place in ordinary practice, after some months, in cases where cement is really bad, may be ascertained in a few hours, in the following way:—Take samples from sundry packages, gauge them, taking care not to kill them in gauging by prolonging the time indefinitely in mixing.

An hour or two after they are set immerse them in water until the next morning, then take them out, and expose them for a few hours to the action of the wind or sun; if they do not continue solid, or if they crack all over, or blow in any way, then the material is not suitable for the job, and ought not to be used; if, on the contrary, they remain sound, without any flaw or fissure, or alteration of form, it may be used, as no disastrous result in the structure need be anticipated ever after.

The foregoing has reference to plastering work, but the same applies to other work as well.

When Portland cement is used for brickwork in any situation, but more particularly in the formation of tanks or reservoirs intended to contain a liquid, one thing should be strictly attended to; that is, fully to saturate with water the bricks or stones to be joined, in order to prevent the abstraction of any part of the water from the cement with which it is mixed.

The setting of cement, although we cannot fully explain it, we know is governed by the laws of chemical affinity. These laws require that the ultimate atoms of matter should be in certain definite proportions, with regard to each other, to render their union complete and lasting, for the want of the proper share of either substance will destroy the solidity of the whole. This might be illustrated by reference to the formation of many compound substances, and is no less true in the case before us. For, if the unsoaked, porous, thirsty bricks or stones are permitted to deprive the cement of a large portion of its water, which is required for its own crystallization or solidification, it is left minus so much of that which is necessary to its proper internal action, and want of soundness in the structure is the result. Should the reader have any doubt about this, let him, by a simple experiment, test it for himself thus:—Let some cement be properly mixed (not killed): with this let two dry bricks be joined together face to face. Let two other bricks be well soaked in water, and put together also with the same mixture. After a few days shall have elapsed, let a measurable strain be applied at right angles to the plane of the joining, tending to separate one brick from another. The difference in the adhesion of the one pair, compared with that of the other, will manifestly show the importance of attending to the above suggestion.

The next and last two questions are, as to the quantity of sand the cement will carry, and also as to that of colour.

The former of these two is the economical part of the subject. I should say, however, that it is not unreasonable to expect to be able to mingle three measures of sand to one of cement, for plastering plain face-work; the quantity will much depend upon the cleanness of the sand and the sharpness of the grit. All loamy matter should be carefully excluded, as this is very detrimental to the cement employed, however good.

A few specimens of cement, gauged with different proportions of good sand, will readily show the limit to which the quantity of this material can be extended.

As to the colour of cement, it is a remarkable fact

that strength and good colour generally accompany each other; that is to say, if a Portland cement shows, after being used, a deep colour, inclining to redness, it rather indicates that the same is not strong; but if all other things concerning it be right, the grey, or lighter colour, would indicate strength. I conclude with a recommendation, that when a front is to be done, the quantity of cement required to complete it should be estimated. The total quantity should be obtained, and turned out on some floor in bulk, after having tested it as before described. Thus by mixing the whole quantity together, uniformity in colour and time of setting will be more likely to be obtained. Moreover, should the cement happen to be too fresh or hot, it would by this exposure become cooled down, and thereby work much more pleasantly.

It may be urged, that all this is a source of trouble; but what is a little trouble, compared with the satisfaction of making a good, sound job, that shall be creditable to all parties concerned in it.

ISAAC CHAS. JOHNSON.

ON ANCIENT TIMBER FRAMING.*

I CAN bring to your notice no examples of timber houses earlier than the fourteenth century, nor do I think it probable, owing to the perishable nature of the material, that any of an earlier date, in a perfect state as to their original design, are to be met with.

M. Viollet le Duc, in his admirable and most useful work now issuing from the press, describes, as follows, a small house of this period, which was in existence about three years ago, opposite the south façade of the cathedral at Chartres.

The timber framing, which is only one floor high, commences at the one-pair story, the construction underneath being of rubble stone-work, strengthened under the bearings by piers of solid dressed stone: on these are placed the beams which support the floor joists. These beams extend to the outer face of the wall, and on their extremities are placed the sills, into which are framed the principal posts directly over the beams. Between these principal posts, smaller ones rise from the sill, and are framed into a head, which is tenoned into the principal posts. These posts serve as the divisions of the windows, the heads of which are formed by trefoiled curved braces, and the whole framework is further strengthened by the window-sills and the cross braces beneath them. Into the head are framed posts, lineable with those below them, supporting the plate on which the roof rests. This plate is, as was usually the case, a double-framed one. The outer plate, which carries the secondary rafters, is placed on the ends of the beams which rest on the principal posts, and, projecting beyond them, are supported by brackets. These beams serve as tie-beams to the roof, and also carry the ceiling joists. The inner plate, which is well supported by the posts, receives the feet of the main rafters of the roof. The spaces between the framing not reserved for lights are filled in with light masonry.

When a house of several stories was built entirely of timber, it was the usual custom for each of the upper stories to overhang the one below it: the general reason assigned for this has been, that in towns (which in those days were always surrounded with walls), space was too valuable to be lost, and, therefore, that which was necessarily given up for the streets, was sought to be recovered by increasing the size of each floor as the house rose, by thus overhanging the stories. I am not at all inclined to agree with this explanation, because houses without the walls were so erected. It is true that the custom of town building may have been followed as the population gradually spread over the land, but I think that the necessary requirements of the material are more likely to have suggested the practice. The reasons that I think induced the builders to overhang their stories are, that if the same beam into which the lower posts were framed was mortised to receive the feet of the upper ones, it would have been too much weakened by all the mortise-holes: a second beam was therefore employed, which might certainly have been placed directly over the first one which served as a head to the lower framing, but by projecting it over, as was their custom, they thus formed a good protection from the weather for the framework below.

It would be for this same reason that the gabled fronts of these timber houses were always made to project over the face of the upper story.

In the decoration of framings the same breadth of treatment is discernible as that which regulated the architects of the period in their stone buildings. The edges of the different timbers were chamfered, carved, or moulded, according as the artist required to employ more or less richness in his design; but these mouldings always receded from the general face of the structure in which they occurred, the only exception being that, here and there, as under the windows, a small piece of timber would be framed, projecting slightly, and moulded after the manner of a string course, to throw off the wet.

A house from Halberstadt, in Prussia, of about the middle of the sixteenth century, is a very pleasing example of this style of framing, affording a variety which I have not met with elsewhere. The space under the window-sills, instead of being filled in and stiffened with cross-braces, as in the example from Chartres, is provided with triangular pieces of timber, which rest on the beam and unite it with the upright posts. This expedient answers the purpose of stiffening the uprights admirably, and at the same time offers a good field for decoration, which the artist has very judiciously availed himself of.

Another drawing which I have had prepared is that of a house at Orleans, somewhat later in date than the one just described from Halberstadt, and, though still pleasing in its general effect, bearing in it the elements of debasement, the whole of the decoration being brought out in front of the wall surface. They are all, however, wrought out of the solid timber which forms the construction of the building, and not applied; but they are inappropriate and out of character, inasmuch as the posts which support the several beams are carved to represent pinnacles, which of course would be inadequate to give support to any superincumbent weight.

I have, from want of time, been unable to place before you any of the well-known specimens of timber houses with which our own land abounds: this is the less to be regretted, as they are probably familiar to most of my hearers, and have been illustrated so frequently, that I have thought it would be taking up your time uselessly to dwell further upon them. I must not, however, dismiss the subject without briefly calling your attention to the interiors of these buildings, every part of which was carefully attended to; and in country villages even now you may not unfrequently meet with houses which externally show no signs of antiquity (thanks to the improving hand of stucco), but which internally yet retain some lingering traces of their original beauty, as some quaint old oak staircase, or a richly-panelled apartment with the timbers of the ceiling well moulded or carved, or even, in some out-of-the-way corner, a panelled door and frame. They are, however, I regret to say, fast disappearing.

Most interesting examples of timber framing are yet to be found in the porches of some of our village churches: these always have a very pleasing and picturesque effect. In addition to these, sometimes, though more rarely, the ancient lytch-gate is to be found. Within the churches themselves (though these would come rather under the head of church furniture than timber framing) I would call your attention to the magnificent remains of chancel-screens, with which many of our churches are still enriched: the greater number of them, I am sorry to say, are much mutilated, and in a sadly dilapidated condition.

Among the most important works, and which demanded the utmost care on the part of the carpenter, was the construction of roofs, and on this head I propose now to offer you a few remarks, which I shall confine entirely to the works of the Middle Ages, as it is only among them that we find these essential parts of all buildings treated in an architectural and artistic manner.

It is not my purpose to enter upon the subject of the origin and gradual development of roofs, or to draw a comparison as to the respective merits of stone vaulting or open timber roofs as coverings for our buildings, but to occupy what time we have yet to spare this evening with the description of Gothic roofs from the time they first began to be treated with artistic skill.

It is somewhat singular, but, nevertheless, I believe a fact, that no other country can boast of such magnificent roofs. Though there are many to be met with abroad of very large span and of clever construction, yet none at all compete in artistic merit with our own.

For the more convenient description of these roofs we will divide them into two classes. The one where the rafters are supported on a ridge and purlins, framed in between the several trusses, and which we will call double-framed roofs; the other, where every pair of rafters is trussed in a similar manner, requiring no other support, and which we will call single-framed roofs. Roofs of this last-named class are to be met with in this country more frequently than those of any other description: they were constructed with or without tie-beams, which in these roofs were sometimes employed quite independently of the other timbers, being simply laid across the building from wall to wall, notched down, and pinned to the wall-plates.

In roofs of high pitch these tie-beams are far from pleasing to my eye, appearing as they do to detract from the loftiness of the interiors; and I am induced to think that they were looked upon by the early framers of these roofs in the light of a necessary evil; and though they sought at times to render them ornamental by richly moulding them, yet they were as frequently introduced, and left quite plain, as in the chancel of Northfleet Church, Kent, where they are left almost in their natural roughness, notwithstanding that the roof itself is divided into panels with moulded ribs, having carved bosses at the intersections.

Various methods were resorted to at different times to endeavour to make this feature harmonize with the rest of the architecture, but with no very great success. As the carpenters, however, became more expert in their craft, it was found to be quite possible to frame roofs securely without tie-beams; and having once cast off the restrictions which these imposed upon them, and by which the genius of the artist was greatly fettered, the architects of the Middle Ages appear immediately to have profited by their newly-acquired freedom: they saw that their favourite form, the pointed arch, could be safely employed in their roofs without the accompaniment of the unsightly tie-beam, and at once carried to a perfection, till then unattained, and hitherto unsurpassed, those splendid roofs, the pride of our oak-bearing land.

Single-framed roofs are sometimes met with having only diagonal braces connecting the rafters. These occur where the span is small, as over a porch. It was probably first had recourse to there for the purpose of gaining headway, but its superiority in general effect over a tie-beam roof could not but lead to its being preferred and substituted for the latter.

In roofs of this class, but of wider span, each pair of rafters was framed with a collar-beam, and was also further stiffened by braces crossing at times above the collar, and at others being tenoned into its under side: when the latter was the case, a second collar or wind-beam was generally introduced above the first.

Though we find these roofs mostly with their naked timbers exposed, it is certain that they were frequently boarded underneath, forming thus a polygonal barrel-vault. Moulded ribs were generally in this case applied on the underside of the boarding, dividing it into panels, the intersections of these ribs being covered with carved bosses.

A perfect barrel-shaped vault was at times formed by the employment of curved braces framed into the angles of the trusses formed by the intersection of the different timbers, as over the chancel of Solihul Church, in Warwickshire: in this instance the timbers are left quite plain. A very handsome specimen of this description of roof was discovered some years ago by Mr. Scott over the chancel of St. Martin's Church at Colchester: all the timbers are richly and beautifully moulded. This roof, though only of small span (about 14 feet 6 in.) has tie-beams with king-posts of octagonal form supporting a longitudinal stiffening-rib, with which the curved braces unite, their intersections being covered with elaborately carved bosses. This roof was, when Mr. Scott first discovered it, and I believe still is, concealed by a flat plaster ceiling. It is a great pity that it should be allowed to remain so, as the roof is unquestionably one of the most beautiful and interesting of its description that can be met with.

These roofs even without tie-beams are by no means confined to buildings of small span. One occurs over the nave of Reedham Church, in Norfolk, which is 31 feet wide. The nave of Ely Cathedral is also covered with a roof of similar construction.

In M. Viollet le Duc's work a very fine example is given. Its span is about 36 feet. It covers the great hall of Sully-sur-Loire, which, as was usually the case in these buildings, occupied the whole of the upper story. The walls, which beneath this chamber are nearly 6 feet thick, are, at the level of the floor, reduced to about half, the space thus gained forming part of the galleries of defence outside each wall. The additional width required for these galleries is carried on the machicolations, the inner end of which tails well into the walls, and the weight of the breastworks is counterbalanced by the inner walls of the hall itself, which runs up above the roof-plates: these are placed at a height from the floor just sufficient to allow headway for access to the galleries of defence; they (the plates) are, as usual, double-framed, and from the external one rise the rafters at a very acute pitch. Into these are framed two collar-beams, the lower one being somewhat more than half way up the roof from the wall-plates. Between these collars run two longitudinal pieces of timber the whole length of the roof, connected together with cross-struts, which serve as a great steadiment for the roof, and prevent the trusses from racking or leaning over sideways. From the wall-plates spring curved pieces of timber the same thickness as the rafters, connected with them at their feet, and into which they are again framed, where they become tangent, uniting at their upper extremities just under the lowest of the longitudinal pieces, thus forming an arched covering the whole length of the chamber. The galleries of defence are roofed over, with secondary rafters, pinned at their upper extremities into the main rafters, and pitching on a plate which rests on the thin wall forming the breastwork of defence. This secondary rafter is further stiffened and prevented from spreading by a strut, which connects it with the principal wall-plates. The underside of this strut, and the corresponding part of the rafter into which it is framed, are curved on their undersides, forming an arched head the whole length of the gallery. This hall is lighted by dormers on each side of the roof about 15 feet apart, and probably by large windows at either end, but of this I am not sure.

The next roof which I shall beg to call your attention to is also from France, over the church of St. Jean, Chalons-sur-Marne, with a span of nearly 20 feet. In this instance a tie-beam is introduced, with a king-post, into the upper end of which is framed a longitudinal ridge piece, stiffened with braces, which spring from the king-post, just above the intersection of the cross braces, with which all the rafters are connected together: each pair are also further strengthened by curved pieces of timber, the upper ones uniting the rafters with the cross braces, the lower ones bringing down the line of the arch formed by these curved pieces to the inner face of the wall, and connected with the bottom of each rafter by a cross piece, which we will call a wall beam; thus forming a foot for the roof the whole thickness of the wall.

The feet formed by these wall beams, connected with the rafters by struts, perform a very important duty in all Gothic roofs, and are the germ of the hammer-beams, which were introduced in roofs of later date.

I will now proceed to describe more fully the origin and use of these hammer-beams. If you compare the foot of a rafter as framed in a trussed-rafter roof, and likewise the lower part of a hammer-beam trussed roof, the similarity of construction in the two specimens is evident. The timbers of the latter are only increased in size, and the base of the triangular foot widened by increasing the length of the horizontal connecting piece, and bringing the strut further into the building: into the underside of this horizontal piece is tenoned the wall-piece, and any strain on the projecting front of the hammer-beam is diminished, and the weight of the roof carried lower down upon the wall by means of a curved brace, which connects the wall-piece and hammer-beam together. In these roofs the collar-beam was at first retained, but instead of cross braces, as were used in trussed-rafter roofs, the collar-beams, principal rafters, and hammer-beams are connected together by curved braces, which are tenoned and pinned into all three of them, forming an arch which not only serves to enhance the beauty of its roof, but is of main importance in binding the whole together.

This construction completely obviates all danger of the roof opening at its base, or slipping on the wall plates; indeed, it is almost impossible for these roofs to spread, so securely are they tied together, and at the same time stiffened by the curved braces with which all the principal timbers are connected; and, besides the strength imparted to the truss by these braces, the wall-pieces acting against the wall would have to resist the weight of about two tons of masonry for every linear foot of wall on which these roofs rest before they could spread at all.

Among the many varieties of this description of roof, we may notice, first, those as just described, with hammer-beams, collars, and struts connected together with curved braces; secondly, those in which the collar-beam is omitted, the curved braces being carried up almost to the ridge, and framed at the apex of the arch into a strut, which receives also the upper ends of the principals; thirdly, we meet with hammer-beam roofs having collar-beams and no struts, the collars, principals, and hammer-beams being united with curved braces; and, lastly, we meet with hammer-beam roofs, without either collar-beams or struts, the whole of the truss being connected together and stiffened with curved braces only. In this instance the arched brace is formed of three pieces of timber, one on either side of the roof, tenoned into the hammer-beam and principal, and reaching up as far as the purlin, the centre piece forming the apex of the arch, being tenoned into each principal, and itself acting as a brace, and to a certain extent as a collar-beam.

In roofs with complete collar bearing, the arched braces were usually made in four pieces, two uniting the hammer-beams with the lower half of the principals, and the other two connecting the upper halves with the collar-beams.

Hammer-beam roofs were always what I have termed double-framed roofs, that is to say, the rafters are supported by a skeleton framing of purlins and ridge, resting on or framed into the principal trusses.

The next variety of these double-framed roofs is one in which the collar-beams are retained and the hammer-beams omitted; but though these latter are dispensed with, the wall-piece (which in the roofs just described was tenoned into their underside) is still made use of, and is framed at once into the underside of the principal rafter, descending as low down on the wall as formerly, and the arched brace springs directly from this to the collar-beam, uniting them both with the principal rafter. An illustration of this mode of framing occurs over the nave of St.

* By Mr. Raphael Brandon. See p. 223, *ante*.

Mary Magdalene's Church, Pulham, Norfolk. On examining the construction of this roof it will be apparent that the effect of the upper portions of the curved braces is almost the same as if the collar-beam was framed lower down into the principals; and the lower portions of the curved braces connect those points with the foot of the wall-pieces, so that it would be impossible for this roof to spread until it had completely broken the curved braces.

A slight variation of this construction occurs at Starston Church, in the same county. In this the collar-beams are dispensed with, the upper portions of the curved braces being tenoned into a strut, that hangs down from the summit of the principal rafters, which are framed into it so as to prevent the possibility of its dropping. Mortises are cut in the four sides of this strut, into two of which the main arched braces are tenoned, and the two other mortises receive the ends of the arched ridge braces: by this arrangement, it is almost impossible for the roof either to spread outwards, or to rock from east to west.

The curved braces in all the foregoing description of double-framed roofs, besides answering the purpose already described, that of conveying the thrust of strain of the roofs lower down on the walls, where of course there is a greater resistance to any lateral pressure, serve as a great steadiment to the walls themselves; this latter, indeed, being by far the most important part of their services, for they are to be met with in roofs, where no lateral thrust occurs, such as most tie-beam roofs, or the flat roofs, which cover the late perpendicular clear-stories of many of our churches. In neither of these cases, is there any danger to be apprehended from an outward thrust of the roofs, and though the arched braces act as a great support to the massive beams, yet in conjunction with them, they form a most effectual counterpart to the walls themselves—a very necessary provision, when we contemplate the lofty clear-stories (so perforated as to present almost the appearance of one long window opening), and call to mind that these are not supported on solid foundations, but nicely poised on slender shafts, at wide intervals apart.

Before dismissing the subject of roofs, which I have only been able to bring to your notice in a very cursory manner, I must say a word on the construction of aisle roofs, which were mostly (what is called) lean-to roofs, whereas all those I have been describing are span roofs. The formation of these roofs is very simple, and may be described as usually consisting of strong timbers, answering the purpose of principal rafters, in gable roofs, laid at each end on plates, the lower plate resting on the external wall, the upper one either supported on corbels projecting from the nave-wall, or inserted therein; wall-pieces are tenoned into the upper and lower extremities of the principals, and curved braces springing from the feet of these meet in the centre of the principal, forming a perfect arch, having the spandrils generally filled in with tracery; a purlin is usually framed into the principals, and on this and the plates the common rafters are supported. In aisle roofs the whole of the timbers, even to the common rafters, were frequently found more richly moulded than those of the nave; these roofs being so much nearer the eye of the spectator than those in other positions of the church, will possibly account for the greater care bestowed on the details thereof.

I should be wearying you, and trying your patience most unwarrantably, were I to attempt to enumerate any more of the many beautiful varieties of open timber roofs with which this country is enriched, the most noted ones, such as those at Westminster, Hampton Court, Eltham, Beddington, Athelhampton, South Wrexhall, Croydon, &c. &c. having frequently been illustrated, must be familiar to most of you. I greatly regret, however, that I have not been enabled to lay before you (as I had hoped to do), an illustration of a roof, upwards of 62 feet span, which is still in existence at La Hague, in Holland. It is of very bold construction, but is not to be compared in richness and artistic design with our roofs in this country; I will not, therefore, trouble you with any further description of it, which would scarcely be intelligible without a drawing. My paper is now almost at an end, and I fear I shall have disappointed many, if not most of my hearers, by not having alluded to any particular style of architecture, or to the ornamental accessories and decorations of designs. I have purposely avoided this, because to my mind mere decoration is as nothing compared with soundness of construction, and the truthful use of building materials. After these have been sufficiently studied, the general masses and outline of a building, are much more important points to be attended to than the ornamentation of the different features: if the grouping of the various parts of a building is well managed, it really matters little whether the arches over the openings are round or pointed. The selection of one or other mode of covering an opening will sometimes be decided by the position in which it is placed, and the same building may contain both without its effect being thereby injured. The choice of this must, and may safely, be left to the taste of the architect, who shows himself thoughtful for the other and more essential requirements of his work. In ornamenting a design, it must always be borne in mind that decoration should be a grace or beauty added to any necessary constructional features: for instance, the jamb of a door opening might, for all necessary purposes, be left quite square: the fear of this square edge being chipped or broken away by the use of such opening, probably led to the square angle being cut off, or chamfered, and subsequently with the view of adding ornament, this chamfer was worked into mouldings, with carved work introduced here and there between the different members. This would be a legitimate manner of ornamenting a necessary feature in a building, but you will, I am sure, readily understand that it would be simply absurd if, because a beautiful door-jamb had been introduced judiciously in one design, it was repeated merely for ornament in a situation where there was no doorway.

So, again, a covering outside an entrance doorway is useful, and may be ornamental: it matters little, if it answers its purpose, whether it assumes the form of a close porch or a portico; but because the columns are beautiful when used in the latter, do not when there is no portico to a building stick them against the wall on either side of the doorway: this is just as ridiculous as executing a door-jamb where there is no door. Blank windows, as they are called, inserted in a wall where light is not required, every one will admit, is an equal absurdity, and yet how commonly they are used in the present day.

Innumerable instances of such mistaken ideas of the beautiful could be mentioned, but I believe it is enough to point out the error generally, to prevent its repetition. Art cannot flourish any more than mankind, without common sense and truth.

NOTES ON TOWERS.

THE three chief uses of church towers are:—

1. To serve as a means of lighting the church.
2. To support a clock; and,
3. To hang bells in.

1. When a tower stands at the intersection of the nave and transepts of a cruciform church, it should be used as a lantern, and not for bells. For, in the first place, a lantern tower adds a lightness and majesty to the interior of the building, the loss of which the finest toned bells will not fully compensate for; and you cannot have, without danger or misproportion, a lantern story, ringing story, and bell story, all in the same tower; and much mischief has been done to some of the finest structures through attempting it.

At Durham it has been done at the expense of proportion; at Salisbury, with danger to the whole fabric. At Lichfield, the centre tower is beautifully proportioned externally, and would form a splendid lantern if it were open up to the top; but now it is wholly lost to the interior of the church to accommodate bells. St. Saviour's tower, in Southwark, has two stories, both taken up for bells and bell-ringers, so that the centre of the church is nearly dark. A gallery is sometimes substituted for the ringers' floor, as at Southwell Minster; but this is inconvenient when the opening is large enough to admit the light, and obstructs the light when of sufficient width for the convenience of the ringers. And here I may take the opportunity of expressing some surprise, that after what occurred at Ely in the fourteenth century, such a thing as a square central tower has ever been erected; and that such a glorious example as what was there done, has never been imitated but once.

2. As a clock-tower, the central tower is well adapted when, as in England, it is the highest tower; and if there are no swinging bells in the same tower with the clock, so much the better. It is obvious that bell-ringing must affect the movements of the clockworks, even had we not facts to demonstrate it. Those clocks in London which have been remarkable for correct time, are in towers which have but one or no swinging-bell. Whereas, of those in towers with peals of bells, few can be depended upon. The most complicated clock in London is that of St. Clement Danes. It has to work four pair of hands, to chime quarters, on four bells, to strike every hour twice, and to play tunes at two hours of the day and night. It is placed at a high level, on a slender tower, with three tiers of bells over it. The middle tier of two were added a few years ago. No wonder that the clock should chime false, and the four dials denote four different hours of the day.

3. A tower built for the reception of bells intended to be raised, should have a solid foundation, not four arches nearly as wide as the tower itself, leaving four piers not much bigger than the thickness of the wall which they support. Bells require a tower to themselves, for they will spoil the best clocks if raised. In Sir Christopher Wren's towers, and others built by his imitators, the substance of the walls was concentrated at the angles, leaving a moderate-sized arch on each side, and only the same internal area as would exist in the case of four straight walls. I think this is the soundest construction, and is as suitable, or even more so, in Gothic architecture than in Classic, for I think Sir C. Wren took his idea from the Mediæval tower of Antwerp Cathedral. This arrangement also admits of a staircase being carried up in the substance of the wall, without diminishing strength, besides doing away with the necessity for buttresses, a desirable object in some large towers; and the tower, if thus carried up its whole height, will be more fit to support an octagonal or circular spire or lantern. The mean internal area should be half the external area; and then, if well built and of good materials, the tower will safely bear as many bells as can be hung on one level. I have seen towers which have had two or more bells subsequently added to the above-named complement, which showed but too plainly, when viewed externally, in which corner the two new bells hung.

A diminution and entasis are desirable both for appearance and strength. They are common features in Essex and Middlesex, and the absence of them may be noticed by any one going from Essex into Suffolk.* The tower of All Saints', Colchester, has an entasis, and diminishes from 22 feet to 19 feet, and has internally an offset at each floor and at the roof, so that no timbers run into the walls. This is one of the few towers in Colchester that escaped from damage at the siege, and yet it was struck several times, as may be seen on the side most exposed, and facing the hottest point of attack; the tracery and mullions of the bell-story being battered evidently from without. With regard to other uses to which towers are applied, a few suggestions may not be out of place.

There are two towers in London and some few in other places having octagonal lanterns not containing bells—St. Dunstan's, Fleet-street, and St. George's in the East. These lanterns might be glazed and illuminated. This would not only be ornamental, but useful, especially in the case of the latter church, which stands near the port of London, and is visible for miles down the river. Another use to which towers might be applied is that of a water tower. One of the west towers of a cathedral is generally a mere ornament to match the other. This empty tower could be made to contain a water-tank for supplying fountains in front of the church.

S.

* The round towers of Suffolk have the entasis, but not those of later date.

BROMPTON AND KENSINGTON IMPROVEMENTS.

IN the progressive increase of London, no quarter has advanced so much in style and finish as the district lying between the Old Brompton and Kensington roads. The aspect and position of the site is decidedly the best, as well as the most vicinal of the new suburb: it ascends gradually from the New Cromwell-road (which has an elevation of 30 feet) to the Kensington Gore-lane, varying from 56 to 60 feet above Trinity high-water mark. The gradual ascent much favours the drainage; and the altitude is quite sufficient to raise it above the fuliginous and swampy influences of Pimlico and Belgravia; whilst the quality of the soil, which is a light loam, on a deep substratum of dry gravel, assures an atmosphere the most favourable to health.

It would appear that the Royal Commission, in a spirit of true liberality, has secured to the public the inestimable advantage of another park in this locality. A long parallelogram, of about 40 acres, opens out from Hyde-park, dropping by an easy slope towards Thurloe and Onslow squares. As yet it is unembellished, save by the luxuriant evergreens and trees of the grounds, late Lady Blessington's, and by the few straggling forest trees, hollies, and orchards, which formerly flourished and fructified on this the most genial of our metropolitan precincts. The scope reserved is paled in, but save the eradication and removal of some trees and shrubs of ancient growth, there is no symptom of landscape gardening, nor of adaptation to the predestined horticultural effect.

We have seen naked hills and swampy hollows suddenly transformed into smiling gardens; the Crystal Palace, Victoria and Battersea Parks, demonstrate what taste and skill can effect, even in the least favourable positions; what, then, may not be achieved on the area now before us, under the direction of arborists and florists such as this age possesses? On the noble roads skirting the new Hesperides—the Exhibition-road on the east, the Princes-road on the west, and the Cromwell-road on the south,—ranges of houses are being soundly constructed, and rapidly finished. As yet, however, the whole line of frontage to Hyde-park has not been secured; the frontage of the late Exhibition offices has been demolished, and now stands, as the palaces of Canton are said to exist, barring approach to parks of jungle, which our adventurous invaders have discovered lying as in primæval wilderness! But there is a portion of the frontage, perhaps about four acres, at the north-east angle, which still continues to be private property, and which is essential to the integrity of the new park.

London is decidedly a utilitarian city; great thoroughfares stand for years unimproved, even where improvements are most easy of effectuation; newly-projected streets continue as at first laid out, trackless apertures between arched causeways, simply because it is left to private enterprise, or private caprice, to build up the lateral ranges. The difficulty in England is, that any proprietor may obstruct the completion of a grand design, as the blacksmith of Brighton stuck to his forge and anvil, until the Fourth George gave 10,000*l.* for his smithy!—he was his own assessor.

Utilitarianism and the zealous guardianship of private rights have their advantages, but power and authority may also be too diffident in the assertion of matters that are of vital urgency to public convenience. In all great public plans, private interest ought to yield to the general welfare, that is, they ought to give place upon receiving fair and equitable compensation. We are, however, notoriously slow in the completion of grand projects. Victoria-street, Farringdon-

street, and other conceptions of civic grandeur, perhaps more aërial and visionary, slumber on, notwithstanding the great prosperity of the State —we go to work cautiously, and bit by bit. The present national exhibition buildings are but temporary; to aid in the righteous and lustrous objects which they so admirably subserve, no less than five very ancient mansions, with their tiled roofs and dormers, have been whitewashed and utilized. Without, there is no indication of art or science; within, a school such as in England, has never been methodized before, teaches the multitude gratuitously, and elevates the taste of our rising generation, by divine collections, such as the Vatican cannot equal for the purposes of education.

Whilst we admire the conception, the merit whereof is chiefly due to an illustrious authority, we cannot help deploring the tardiness of execution in matters external to the art treasures so bounteously collected. We regard with anxiety the waste aspect of the fine inclosure of green meadows—people accustomed to see luxuriant shrubberies and plantations improvised in a season, and that, too, in situations far less favourable to vegetation, think with pained reflection of the loss of time and opportunity. Trees have been felled, and preparations are being made for new plantations, still the new park is in nakedness and darkness. There are no lights around it to assimilate the place with other public domains, and while enterprising builders are enclosing the borders with colossal ranges, the public work languishes, and the retirement of Cromwellian times hangs about the vicinage as if in mockery of the fast encircling town.

VOX QUERENS.

ANECDOTES OF HOGAN, THE SCULPTOR.

I TRUST a few words from one who knew him well may not be unacceptable to the readers of the *Builder*. Besides possessing great talent and application, he had the simplicity of a child and the heart of a lion; kind, but fearless, an enemy to tyranny and oppression, and although a Roman Catholic, he abhorred the Papal domination, and yearned for Italia's freedom. He laboured incessantly in his studio, and being of a most powerful constitution, required but little repose. His chief variations from close study were foot rambles with gun or sketch-book. He once walked from Naples to Rome in three days, and while his companions were quite done up, Hogan, on reaching the city gates, offered to walk round the walls of the Eternal City. On another occasion, after spending the night with some English visitors, in place of retiring to rest, he returned to his studio, it being daylight, and resumed his studies as though nothing unusual had occurred. His absence of fear frequently caused it to be dangerous to accompany him in his walks and adventures, and his escapes from the knife and rifle were miraculous. On one occasion he was dared to commit an indignity to a young Italian girl, in a thronged thoroughfare on a Sunday. The next moment a gun was levelled at him by the girl's father, who happened to be standing at his street door. Fortunately for Hogan, it missed fire, and in an instant he was on his knees before the offended parent, explained the freak, and, from his frank and earnest manner, obtained apparent forgiveness. On another occasion, while snipe-shooting on the banks of the Tiverina, with a half-pay naval officer, they were surprised by the threatened attack of some ferocious half-bred wolf-dogs. His friend, who was on the safe side of the stream, called to Hogan to ford or swim the narrow stream; but John knew no fear, and with a steady arm and sure aim he awaited the attack, and, after discharging his piece down the throat of the first hound, not having time to reload, he shouldered his musket to renew the combat: but no, his dauntless bearing and the prostrate beast deterred its fellows, who turned tail and took to the hills again. He was equally fearless with the gloomy and revengeful Roman. Making a remark one day somewhat offensive to a native sportsman, each party having a companion, the Italian—a strong and resolute-looking fellow—demanded satisfaction on the spot. "By all means," said Hogan; and springing to the opposite side of the lane, he raised his gun, and demanded, in a clear, firm voice, "Are you ready?" "No," said the Roman, "I will have knives." "Agreed!" said John, giving his rifle to his friend. At this juncture the Italian drew from his sleeve a formidable dagger-knife, the very opening of which, click, click, click, would have tried the nerves of a hero. John, in the same given time, had taken from his waistcoat pocket a small English clasp knife: opening it with the utmost energy, he whirled his toy-like blade three times round over his head, and with a voice of thunder demanded, "Are you ready?" Hearts, not knives, decided the contest. The Roman, thunderstruck and cowed, expressed himself satisfied, and received from his noble and daring, but frequently thoughtless antagonist, his iron grasp, and so they parted. When visiting Hogan last year, we talked over these and numerous other hairbreadth escapes, from fire, knife, and flood. I found him grey-headed, but still the same resolute, warm-hearted, and hard-working John Hogan I had known twenty years before,—with one difference, however. He had married an Italian lady, and had by her a numerous family, varying in age from 16 to 6 years, or less. These, I fear, under present circumstances, must require the aid of friends to assist and bring them out. Ireland will, no doubt, do her part; but I name it that if necessary his friends on this side of the water may know, and may not be backward. I do not think, from what I saw, that his commissions were of much account.

EDWARD RICHARDSON.

A SANITARY FACT.

IN an annual report recently published of the Blue-coat School, we notice that the number of children in both the town and country establishment amounts to 1,080, and that the deaths in the year have only been *two*. This is a marked contrast with the deaths per 1,000 in the London barracks.

It would be instructive to those who still believe in the perfection of the London barracks to examine the arrangement of the dormitories of this school, and then compare them with the homes of the soldier, and they would soon find the reason why so few lives per thousand are lost in this building in the heart of the City.

Children from five to fourteen years of age are not even so safe as the strong men of the Guards, but then plenty of space, good ventilation, and the most scrupulous cleanliness and order are brought into play.

BRISTOL GENERAL HOSPITAL.

THE Bristol General Hospital was founded in 1832, and, from that period to the present, has been carried on in some old and unsuitable premises in Guinea-street.

In 1845, the inhabitants of Bristol were informed that Mr. Joseph Eaton, a well-known citizen and a member of the Society of Friends, had made the munificent offer of 5,000*l.* towards the erection of a new building; the offer, however, being upon condition that the further sum of 10,000*l.* should also be raised towards the same object.

It was not until 1850 that efforts were made to secure to the public the advantages of this princely gift; but at that time the matter was taken up in earnest, and so liberally did the citizens come forward to sustain their ancient fame for charity, that, in an incredibly short period, an amount was subscribed far exceeding the stipulated sum.

A committee was then appointed to select a site, and to obtain and carry out a design for the new building. A site was purchased in close proximity to the old hospital, and architects were invited to submit plans in competition. Twenty-four were sent in, May 1, 1852. The sub-committee appointed to investigate them met fifteen times, each meeting being fully attended, and averaging three hours; and, having selected eight designs, decided to avail themselves of professional assistance, and called in Mr. G. Wightwick, the well-known architect, then retired from practice, and residing at Clifton, who made a thorough investigation of the whole of the designs. Votes were taken upon the four designs recommended by Mr. Wightwick, and the designs were accepted by a majority of nine to two.

Upon the report of the sub-committee being presented to the building committee, it was determined that the four selected plans should undergo a further ordeal, and Mr. T. H. Wyatt was called in to adjudicate upon them; and his report confirmed both the result of Mr. Wightwick's labours and the decisions of the sub-committee; whereupon the design by Mr. William Bruce Gingell, of Bristol, was finally adopted, and he was appointed the architect.

The cost of the building was very much increased, it is stated, by the rise in the value of labour and materials that took place about the time of obtaining tenders, in consequence of the war; but contracts amounting to 14,959*l.* were entered into, in June, 1853, and the works were all completed last autumn.

The hospital occupies a peculiar, and, as it seems to us, ill-chosen site, and may be said to be almost surrounded by water, having the tidal river on the south, the floating harbour on the north, and the Bathurst basin on the west. The site, too, presented singular impediments to the ready planning of a hospital that should combine every modern improvement, and the utmost economy of labour in working with the best and most cheerful aspects; and the manner in which the difficulties have been met will be best judged of by an inspection of the plans.

The principal fronts of the building are executed with pitch-faced blue Pennant stone, squared, jointed, and set in random work, thus imparting a very bold and enduring character, while the appearance of heaviness is avoided by the plentiful admixture of Bath stone about the colonnades, windows, quoins, cornices, strings, &c. Great additional importance is given to the building, by its being raised upon a basement, the front walls of which are slightly battered, so as to throw out and give extra elevation to the tower and breaks in the front, and are executed with pitch-faced Pennant stone, set in courses, diminishing regularly from the plinth upwards, the whole being relieved by mullioned windows and deeply recessed archways, with massive pitch-faced rustics, and voussoirs of Bath stone, and finished with a moulded string course. This basement is not simply an architectural feature, but was adopted for four reasons, viz. to accommodate the ground-floor of the building to the level of the working entrance, which was required to be from Guinea-street, and is about 14 feet above the level of the Basin-wharf, to elevate the wards as much as possible, to obviate the necessity for underground apartments, and to obtain dry and light warehouses, with entrances from the wharf, which should produce a revenue for the Institution.

The warehouses under and about the hospital, are all fire-proof, and contain about 8,000 super. feet, and 82,000 cubic feet; and over those to the southward, there is a spacious airing ground, laid out as a garden, the walks and flower-beds being formed in Pilkington's asphalte, with upwards of 250 tons of mould deposited upon it.

The court-yard on the Guinea-street side is pitched with limestone, the warehouses below being vaulted, and covered with asphalte. The colonnades not only form a feature in the design, but afford ambulatories for the patients to take out-door exercise in showery weather. One is appropriated to males, the other to females; and both these and the garden command an uninterrupted view of the busy scenes occurring at every tide, from the arrival and departure of the passengers, &c. by the Welsh steam-boats, and the large number of coasting vessels always entering and leaving the basin.

The basement plan of the hospital contains two kitchens, scullery, coal and wood stores, two larders, bread, wine, vegetable, and other stores, servants' bed rooms, laundry, washhouse, drying closet and drying yard, steam-boilers, and apparatus-rooms. The entrance for stores is from the Basin-wharf, and a steward's office is placed thereby.

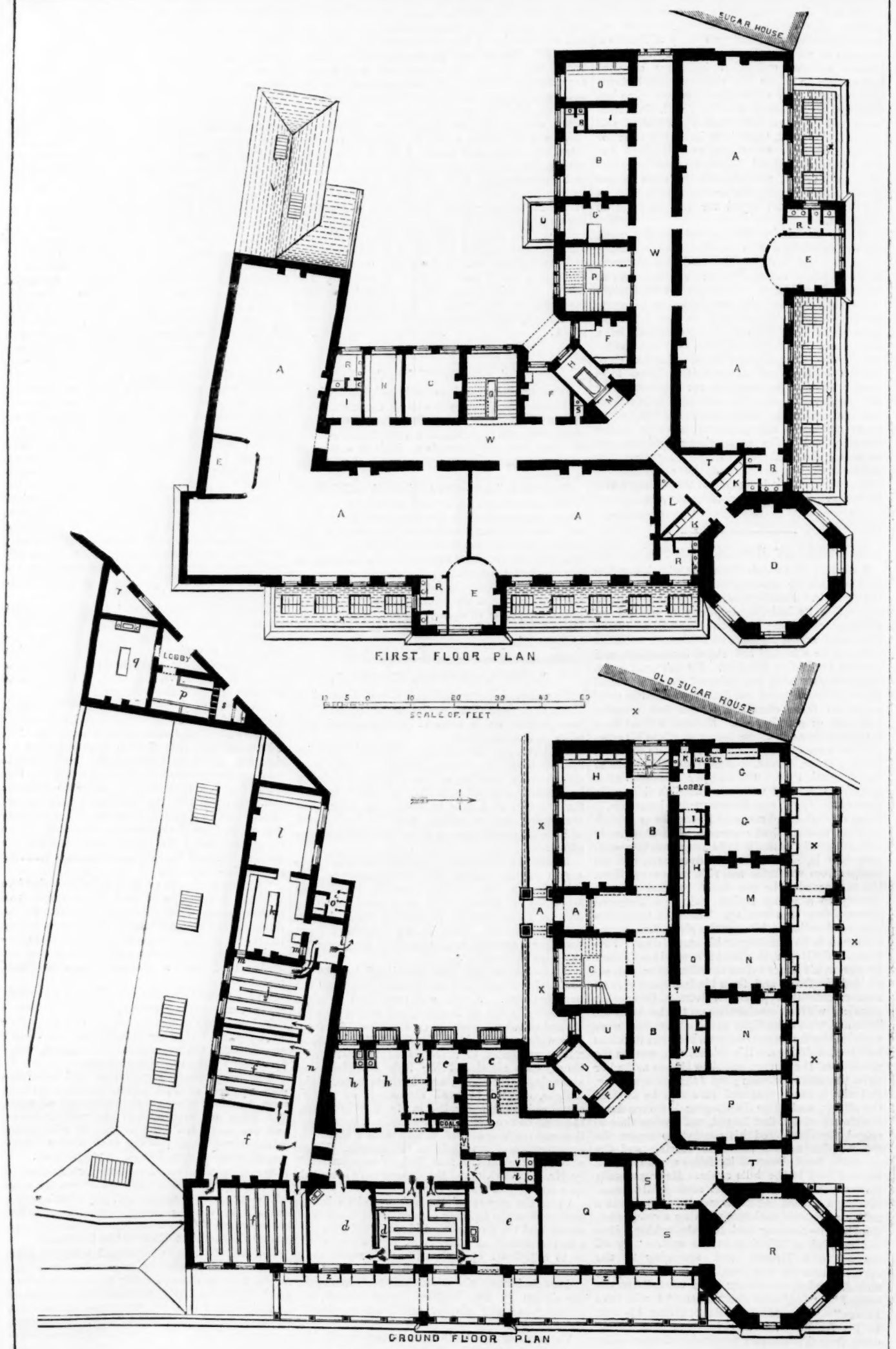
In the ground plan the most cheerful and sunny parts of the building are appropriated to the resident officers, the committee, &c. and the north-west portions to the out-patients, the latter being severed from the in-patients' department, except by a door for the use of the officers.

The out-patients' department will accommodate upwards of 300, and is arranged to prevent confusion through the retracing of steps. The sexes are separated in the waiting-rooms, and the seats are fixed upon the alternating principle, so that all pushing is avoided, and each person passes to consultation, in proper turn.

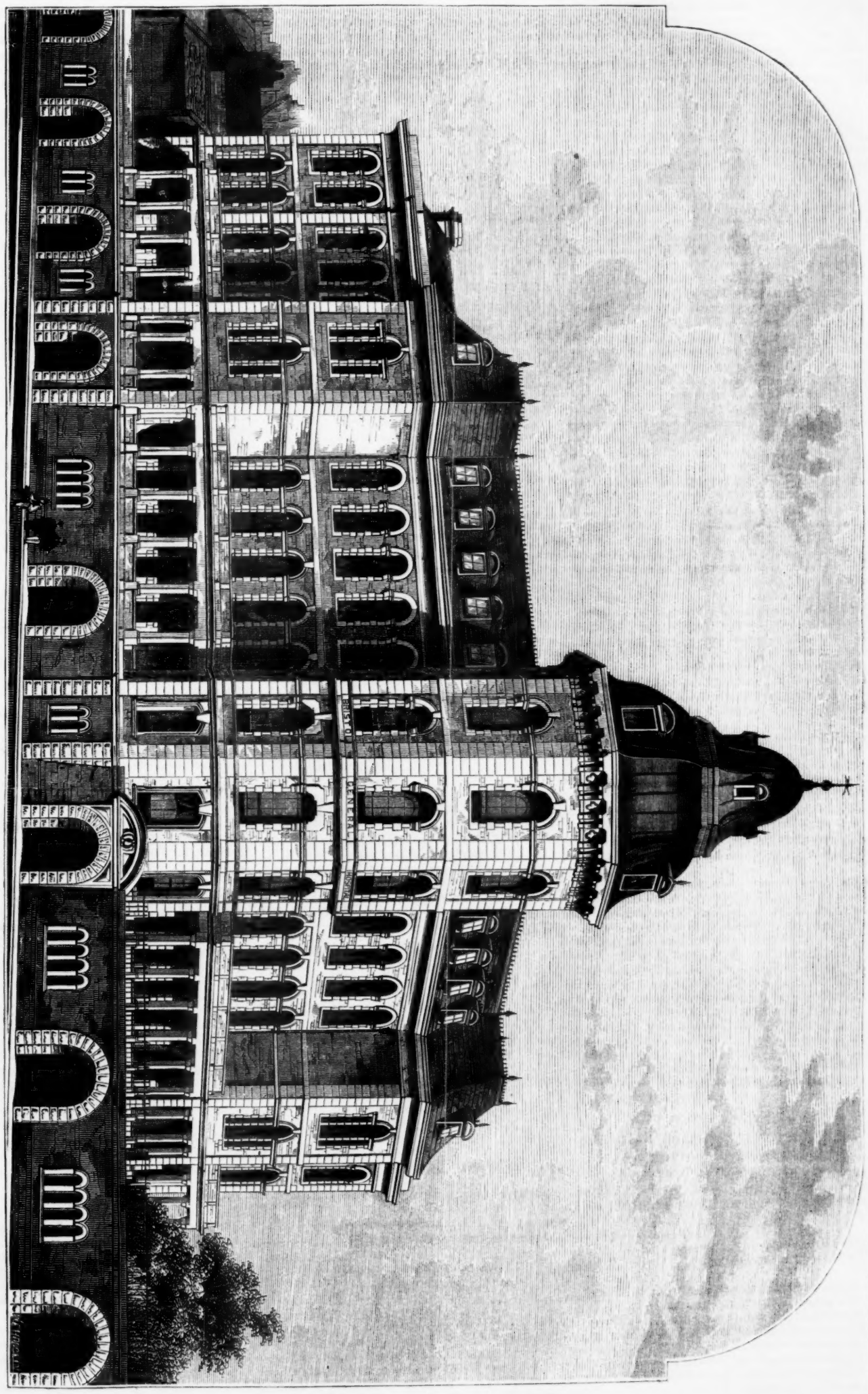
Speaking-tubes run from the porter's-room to the house-surgeon's and matron's rooms, the committee-room, the surgeon's and physician's rooms, and all the wards and corridors. Also from the house-surgeon's and matron's rooms, dining-room, and all the corridors direct to the kitchens.

The first floor is appropriated solely to male patients, and is reached by its own staircase. The second floor is devoted solely to female patients, and is approached by another staircase, divided off from the males' corridor, where passing the same, by an obscured glass screen, but affording communication for the officers only. By this arrangement the patients of each sex can exercise in the corridors, and pass uninterruptedly to and from their wards and day-rooms.

There are ten principal wards, five on each



BRISTOL GENERAL HOSPITAL.



BRISTOL GENERAL HOSPITAL.—Mr. W. B. Gingell, Architect.

floor; the whole well lighted,—four having south, four west, and two north aspects; these last being thought not undesirable for the treatment of particular cases. Two fire-places have been put in each ward, so that the temperate air from the apparatus may be dispensed with when desired. Each room for the nurses on duty is so placed as to be out of the wards, and at the same time command a view over a large portion of them, by which means, it is said, three nurses can overlook five wards. There is a private ward and an exceptional ward on each floor; also the nurses' sculleries, a patients' bath-room, clothes and linen stores, slop-room, coal-stores, &c. All the water-closets are self-acting, and have external ventilation. A severance from the wards is obtained by the interposition of the lavatories; and extraction power is to be always at work, with a view to prevent the air from the closets entering the wards. Each lavatory is supplied with hot and cold water.

Two large and cheerful day-rooms are provided in the tower for the male and female convalescents, each room being octagonal, and having five windows commanding fine views, and overlooking the river, harbour, and basin; several principal roadways into Bristol, and the country about Bedminster and Ashton; a large portion of the city, with Brandon-hill, Clifton, Cotham, Kingsdown, and Knowle.

A steam lift passes from the basement up to the top of the building, well lighted throughout its course, and communicating with each floor at the most central point. The theatre is on the second floor, and by the lift communicating with it, a patient can be taken from any part of the house direct to the operating-table. The room is hexagonal, has the galleries for students, and is amply lighted both vertically and horizontally.

There are twelve sleeping-rooms for nurses off duty, all obtained upon the floor formed partly in the roofs, where they are wholly removed from the busy parts of the building.

The large top room in the tower will be used for a special ward, as required.

The hospital will accommodate 170 in-patients, and the wards contain an average of 1,090 cubic feet per patient.

The whole of the building, except the roofs, is erected upon Messrs. Fox and Barrett's fire-proof system, and all the floors and skirtings, except in the nurses' rooms, are finished with cement; those of the wards and corridors being of Keene's patent, and all the others of White's Portland; so that there are no apertures for harbouring vermin or dirt; and the floors being non-absorbent, are immediately dry after their daily washing, thereby obviating the danger arising to the patients from their having to lie for some time daily in the atmosphere of a swamp, while the moisture, absorbed by wood floors at every cleansing, is being afterwards evaporated.

The warming and ventilating works were executed by Messrs. Haden and Son, of Trowbridge. The fresh air is taken by a shaft in the airing-ground, and under the basement, into the warming apparatus, and thence to all parts of the building. The vitiated air is drawn out near the ceilings by means of flues connected with a large extraction shaft, 100 feet high above the level of the wharf, wherein the air is always kept highly rarified by coils of hot-water pipes, and a large cistern, through which nearly boiling water is circulating day and night, for the supply of all the baths, lavatories, and sinks. It is supposed that, with the doors and windows in the wards all closed, upwards of 120 cubic feet of air per minute is drawn out through each ventilator, 9 inches by 14 inches; and with the door or a window open the quantity is increased to upwards of 150 feet per minute. The theory is, that the extraction is so regular and powerful that the atmosphere of the worst wards will never be foul; nor can it be communicated to the other wards by means of the corridor, there being always an in-draught, it is asserted, from the corridors to all the wards. We confine ourselves now to description, but we must not be supposed to assent to the propriety of erecting an hospital in such a situation as to render this elaborate system of artificial ventilation necessary.

The lift is worked by a small steam-engine connected with the boiler that serves the cooking vessels and washing department, all of which works were also executed by Messrs. Haden.

Gas and water are laid on to all parts of the building, and distilled water can be drawn on each floor and in the dispensary.

The entrance in Guinea-street is a large and appropriate archway, in which are a set of iron gates, each showing the city arms and the date of establishing and erecting the hospital.

The contractors were Messrs. Willcox and Sons, for masonry; S. Bowden for carpentry, joinery, and plumbing; Lewis and Sons for plastering, slating and painting; T. Allen for smiths', founders', gasfitters', and bellhangers' work; and W. Gay for glaziers' work, all Bristol tradesmen. Mr. Wm. Long was the clerk of works.

REFERENCES.

Ground-floor Plan.

A A. Entrance-porch and lobby.
B B B. Corridor.
C. Principal stairs.
D. Stairs to male wards only.
E. Stairs to basement only.
F. Lift.
G G. Matron's sitting-room and bed-room.
H H. Matron's stores.
I. Matron's china pantry.
K. Matron's w.c.
L. Officers' dining-room.
M. Pupils' sitting-room.
N N. House surgeon's sitting-room and bed-room.
O. Lobby for coats, &c.
P. Library.
Q. Museum.
R. Committee-room.
S. Secretary's office and strong-room.
T. Entrance for visitors, and from garden.
U U U. Pupils' bed-rooms.
V. House surgeon's and pupils' w.c.
W. Pantry.
X X X X X. Sunk areas.
Y. Door separating in and out patients.
Z Z Z. Glazed apertures over windows, &c.
a. Out patients' entrance.
b. Out patients' exit.
c c. Porter's rooms.
d d. Surgeon's consulting-room and his patients' waiting-room.
e e. Ditto ditto.
f f f. Physician's consulting-room, and his patients' waiting-rooms.
g. Patients' waiting-hall.
h h. Casualty wards and dressers' rooms.
i. Medical officers' w.c.
j. Dispensary waiting-room.
k. Dispensary.
l. Laboratory.
m m. Sashes for receiving bottles and giving out ditto.
n. Out patients' corridor.
o. Male patients' w.c. and urinals.
p. Dead house.
q. Post mortem.
r. Porter's office.
s. Female patients' w.c.
t. Roof of old building belonging to hospital museum, and not to be interfered with by new building.
u. Roof over new warehouse.
w. Visitors' entrance from Bathurst basin.
x. Colonnade for females.

First-floor Plan.

A A A. Wards.
B. Exceptional ward.
C. Private ward.
D. Day-room.
E E E. Nurses' rooms.
F F. Nurses' sculleries.
G. Patients' bath-rooms.
H. Medical officers' bath-room.
I I. Coal stores.
K K. Patients' clothes-rooms.
L. Slop-room.
M. Lift.
N. Instrument-room.
O. Store for ward linen.
P. Stairs to wards over.
Q. Stairs for males only.
R R R. Patients' lavatories, urinals, and w.c.
S. Nurses' w.c.
T. Foul air extraction flue from ground-plan.
U. Roof over porch.
V. Roof over dispensary and laboratory.
W W. Corridors.
X X X. Roofs over colonnades.

ON COLOUR AND LIGHT AND SHADOW IN ENGRAVING.

The merits of our great engravers scarcely meet with that degree of appreciation which the peculiar and difficult artistic efforts required to produce a high-class engraving really deserve. It is true that the engraver does not in his works display the mental power of great and original painters; nevertheless, he requires a remarkable faculty of imitation, considerable artistic and mechanical skill, and a perfect knowledge of the principles of light and shadow. The painter, by the use of his reds and blues, and a multitude of other tints, produces both startling relief and harmony in a comparatively easy manner; but the engraver, not having the advantage of colours, is obliged, by the ingenious contrasts of textures and lines, and by the proper management of black, white, and grey, to convey the idea of glorious tints—to make distinctions between bright yellow garments and the pale blue sky, which, so far as actual tint is concerned, are but little different in the weight of colour. He has also to study the power of lines, and produce foreground, middle distance, and the more remote parts by the foil of strong and delicate lines, which have also to be suitable to the forms to be copied.

In examining the marvellous engravings of the Italian school before the introduction of etching, it is with admiration that we behold the remarkable effect produced by the simple graver; and it is difficult to decide whether most to admire the exquisite beauty of the drawing or the brilliancy of the general effect. While admitting the above admirable qualities, it must be acknowledged that with the introduction of etching the depth and power of engravings was materially increased; the textures became more varied, and consequently the variety of colour became more clearly expressed. The engravings by Woollett are examples of the clear and transparent depth which can be produced by lines of great thickness, and eaten down far below the surface by the repeated application of acid, refined upon by toning with the graver, cross-etching, and other delicate applications. The thatch of cottages, mixed with and partly covered by mosses; the gloomy yet rich shadows of the foliage; the decayed stone and wood work; the picturesque weeds of the foreground; the human form, the coats of animals, vessels, &c.—are touched in a way which convey with singular force the effect of a highly-finished and coloured picture.

The engravings by the elder Heath had also the merit of successfully representing variety of colour; so do the vigorous engravings by Strange, Sharpe, and others of the English school, whose works for certain high qualities have not been surpassed by those of any other. The works just referred to are distinguished by a glowing harmony of a sort of golden hue, which is peculiar to engravings on copper plates; and this will be readily seen by a comparison with the impressions from the steel plates which during the last twenty or thirty years have come so generally into use; for notwithstanding the skill of engravers such as Goodall, Stocks, Willmore, Prior, and others, there is in these works a want of that vigour which is such a marked and characteristic feature in the prints above mentioned. The effect produced on steel is to a certain extent silvery, cold, and somewhat thin.

In certain instances this, which may be considered a fault, has, we think, been increased by the application of machine tints to the skies. This has been done with a view to the saving of the long time which is required to etch a sky by hand. There is, however, an artistic feeling in a hand-etched sky which the machine always fails to exhibit; and, moreover, it is a query if it produces any saving in the end; for, in order to work the different parts of the plate, so that they may be made to harmonise with the smooth metallic regularity of the machined skies, there is an excess of toning which not only causes much labour, but also leads to the destruction of much of the beauty and freedom of the etched lines, which frequently give so much expression.

SUBMERGING TELEGRAPHIC CABLES.

INSTITUTION OF CIVIL ENGINEERS.

The evenings of March 2nd, 9th, 16th, and 23rd—Mr. Joseph Locke, M.P. in the chair—were entirely devoted to the discussion of the papers "On Submerging Telegraphic Cables," by J. A. Longridge and Mr. C. H. Brooks, and "On Paying out and Repairing Telegraph Cables," by Mr. F. C. Webb. The official report of it is long and interesting.

The discussion was commenced by remarks upon some of the deductions in the two papers, which, it was argued, could not be accepted implicitly. It was contended that there was not any proof of the cable arranging itself in folds or coils at the bottom of the sea, and that the "waste," or surplus length of cable laid down, could not be as much as 30 to 50 per cent. more than the actual distance traversed. There was not sufficient foundation for these statements, and therefore they were considered to be erroneous. By a model exhibited, it

was shown that a small chain, when uncoiled from a roller, round which it was wound, was delivered in a straight line as the roller travelled along upon the upper plane of the model. Hence it was argued, that, allowing for the greater buoyancy, or the reduction of specific gravity, by immersion in water, a cable could be laid at the bottom of the sea, in the track of the ship, exactly as it left the coil in the hold, without any loss of length.

It was remarked, that simple cables with a single conductor had cost large sums of money for maintenance and repairs, while under the compound system, with two exceptions, but little or no expense had been incurred. This should be borne in mind in designing submarine cables in future. The plan of paying-out a cable from the stern of the vessel was objectionable; for the stern, in rough weather, would evidently rise and fall considerably. The effect of this would be to throw great strain on the cable, unless it was allowed to pay itself out to such an extent as to prevent any alteration in the catenarian curve, and thus waste a large portion of the cable, a loss being sustained on the passage of every wave. The preferable part of the vessel for the cable to leave the ship seemed to be the centre, or the centre of gravity, by which all waste from the pitching or rolling of the vessel would be avoided. A conical hole, with the apex of the cone tending upwards, should be made for the purpose, and then the cable would not be chafed by rubbing on its departure on any part of the vessel. The almost certainty of a storm occurring during the operation of laying down the Atlantic Cable rendered it the more desirable, that every precaution should be taken which could be devised to insure success. And if it were not possible to alter a vessel so as to pay out at the centre, then a ship should be specially built for the purpose.

With respect to the durability of electric cables after submersion, it was remarked that pieces of iron fished up from the bottom of the sea were found to be coated with a solid mass of concrete; so that it was fair to presume that the Atlantic cable, when once submerged in the still depths of the ocean, would, before it was destroyed, form for itself a protecting covering. And though gutta-percha, when exposed to the atmosphere, or laid underground, might be subject to decay, yet, when submerged in the ocean, it was found to be perfectly preserved, as was proved in the case of the Dover and Calais cable.

It was remarked that the great experiment of the Atlantic telegraph had the best wishes of all engineers; but it was felt that sufficient attention had not been paid, either to the mechanical appliances, or to the construction of the cable itself, which the vast importance of the undertaking demanded. The cable had not been submerged in its entirety, and tested in that state, to ascertain its condition. Nor had any effort been made to determine what would be the effect upon the gutta-percha core of a pressure of 3 or 4 tons to the inch, at a depth of 2,000 fathoms. The failure was stated to have occurred when the cable was momentarily left in the charge of a workman; but it was much to be deplored that so great an enterprise remained, even for an instant, in the care of unscientific hands.

The statistics of the submarine cables hitherto essayed, showed, that out of forty-three attempted to be laid, six only had failed during the process of laying, four subsequently, and one of the Hague cables was at present under repair, leaving thirty-two in perfect working order. These facts completely disposed of the assertion, that 50 per cent. had either failed in being submerged, or immediately afterwards. Of the ten total failures, three were strictly light cables, with no outer wires, being the only uncovered cables tried; and the two failures of heavy cables after submersion, arose from their being too light. Several cables had, it was true, been broken by anchors, in consequence of the absence of sufficient iron protecting wires, but these had been immediately repaired, and were now in regular work.

On March 30th the proceedings were commenced by the reading of an abstract of a paper entitled "Observations on the Electrical Qualifications requisite in long Submarine Telegraph Cables," by Mr. Alfred Varley.

The communications lately read, and mentioned above, on the subject of submarine telegraphy, had suggested the inquiry whether the cables, as at present constructed, did fulfil, in the best manner, the electrical portion of the problem.

The laws of conduction, as ascertained by the author, as the result of direct experiments, were, first, that a wire one mile long offered half the resistance of one two miles long. Secondly, that two wires, each two miles long, when placed side by side, which was the same as one of double the area, offered the same resistance as one wire one mile long. With regard to induction, the results of experiments tried by the author and Mr. C. John Varley, showed that with flat plates it followed the same law as conduction, decreasing in regular proportions, as the insulating medium was increased; that was to say, if the inductive force through one plate was twelve, through two plates it would be six, through three plates four, and so on.

The second paper read was "Description of the Improvements on the Second Division of the River Lee Navigation, with Remarks on Canals generally," by Mr. R. C. Despard.

The walls and pier were of brickwork, faced with hard pavior stocks, set in Portland cement, and backed with concrete; hoop-iron bonds being introduced at every eighth course. The invert of the smaller lock was composed of Portland cement concrete: that of the larger lock was originally of the same material; but, owing to the percolation of water, a width of 6 feet in the centre was of two half-brick rings set in cement.

The principal points of novelty were the combined pointing cills and hollow quoins, both of cast iron, and the sluices. The cills were each cast in one piece, and were of sufficient length to allow of the ends being firmly built into the lock walls, thus forming the foundation plate for the gate pivots. The arrangements were such that each cill and pair of hollow quoins were placed in position and firmly bedded in less than two days. When the locks were sufficiently advanced, the gates, framed ready for fixing, were lowered entire, instead of being, as usual, erected piecemeal in the lock-pit—a tedious operation, necessarily performed after the lock-walls were built; whilst, by the plan adopted, the construction of the gates was entirely independent of the lock-work. The balance beams, anchor caps, foot sockets of the heel posts, and fender frames (of which there were four built into each lock wall), were all of cast iron.

A steam dredging machine was employed for deepening the river, the average cost of raising material being from 10d. to 11d. per cubic yard, according to the weight, including a "lead" of 1½ mile, and allowing for wear and tear of machinery.

The total cost of the works was about 22,000*l.* which amount included 4,000*l.* for land, and 2,000*l.* for plant, now being used on works higher up the river. They were designed and executed by Mr. Beardmore, assisted by the author, without the intervention of a contractor.

FOREIGN RAILWAYS AND OTHER WORKS.

THE Algerian railway surveys from Algiers to Blidah are nearly finished to "*Maison-Carrée.*" Owing to the favourable nature of the soil for railway works, it is expected that the works will shortly commence, under a concentrated force of 4,000 soldiers, who willingly exchange the bayonet for the pickaxe. Their pay is to be doubled. It has been already stated that in default of any company presenting itself, these railways will be open to the volunteers of the French army. The supply of tools, such as waggons, wheelbarrows, picks, &c. is ready for the work and sufficient; and it may be noted that the Government of France will facilitate, by special means, the emigration to Algeria of the skilled Paris workmen who can either superintend or do the work themselves. As to the French soldiers, they are to receive high wages while at such work.

The great tunnel under the Alps, near Modane, proceeds with uninterrupted activity. At that end the heading is driven 85 mètres: at the Bardonniche end more than 100 mètres have been done; and as the rock is very hard, full section is being taken for a length of 60 mètres.

On the favourable report of the Spanish engineers appointed to inspect the line from Madrid to Alicante, it was opened to the public, the first regular train having started from Madrid on the 6th ultimo, at 8·30 p.m. and transported the principal functionaries of the company to the seaside. The inauguration ceremony is postponed till May, when it is expected that the Queen will honour it with her presence.

In the south of Spain the works on the Seville and Cordova and the Seville and Cadiz lines are pursued actively. On the latter the works are much advanced, all the land has been purchased, the earthworks, masonry, and guard-houses, &c. are finished for double line for 90 kilomètres in length. The materials for the telegraph are on the ground, as are also the sleepers, rails, and fishes for 22 kilomètres. The ballast is ready, and the first delivery of engines and waggons, which took place lately, enables the line to be ballasted rapidly, and the permanent way to be completed. Everything permits the company to hope for the completion of all the line at the end of this year. The section of Cadiz to St. Fernando is expected to be opened next May.

According to the *Gazette de Carlsruhe*, the following railways have been presented to the chambers by the Grand Duchy of Baden:—

1. Extension of the Waldeshut Railway to Constance. It is not yet decided whether this line is to pass through the Swiss Canton of Schaffhouse or whether it is to be wholly in the Baden territory.
2. A railway from Durlach by Pforsheim to Wurtemburg, joining the state railways of Wurtemburg near Mühlacker.
3. Junction of the Baden state railways with those on the left bank of the Rhine, near Kehl and Waldeshut.

The above lines are to be constructed at the expense of Government. In addition to these new projects, the following have been conceded to companies, with interest guaranteed by the Government:—

1. Heidelberg to Nosbach, in the direction of Warzbourg.
2. The Offenbourg Railway by the Kinsig valley to Hansach, and the Villingen Railway by Donaneschingen to some convenient point on the Waldeshut and Constance Railway.

The Ducal Government proposes to contract for a loan for the construction of the Heidelberg and Warzbourg line. Nothing has yet been decided upon as to the means of raising it, and it is not necessary that it should be obtained before May next, as the Government have sufficient funds to proceed with the surveys without waiting for the loan for construction.

In July the Cambrai and Saint-Quentin line is to be opened. At St. Valery the earthworks have been completed: the masonry necessary for their solidity is the wonder of all the passengers from Noyelles to St. Valery, who have a good view of the works. In that section all is ready for the rails.

The Lapaliss and Roanne line is to be opened for public traffic on the 15th June.

The works on the Thiouville and Luxembourg Railway are about to commence. Messrs. Sturel and Co. of Metz, are contractors. The Grand Ducal Government are to execute at their own expense that portion of this line destined to unite the French frontier with Luxembourg. It is to be finished in two years.

In Belgium, the works of the Ecaussines and Erquelinnes line are in most active progress. The works are unusually heavy for a flat country in general. Between Hoedeng-Goegnies and La Louvière there is the greatest embankment in that country; it is 22 mètres and a half high: that of Lodelinsart is only 19 mètres 60 centimes. Moreover, the embankment is 700 mètres long, and cubes 300,000 mètres. During the last month, 32,000 were tipped, and 40,000 are expected to be done this month (March).

The Russian Railway Company (*La grand Compagnie des Chemins de Fer Russes*), have not succeeded in getting any rails in Belgium, but they have concluded bargains in France for 40,000 tons, and in England for 400 only.

In Russia a new company is in course of formation. It proposes to construct 2,000 kilomètres of line, which on the one hand will join Odessa (by Kieff and Mohileff), with the French Company's railway, and so effect a junction with Moscow and St. Petersburg, and on the other hand a branch line passing by Radzurl, will join the Austrian railway, and be in direct communication with Vienna. Mr. Beckendorf is the founder of this company, in connection with the important English banking firm of St. Petersburg, Messrs. Thomson, Bonnar, and Co. The company have expressed their intention to employ none but Belgian or French engineers: so Bresson's *Gazette des Chemins de Fer* states.

The Russian Government have just given a concession for a railway from Ribiusk (on the Volga) to St. Petersburg. The communication between these towns (700 kilomètres) is at present by canal, and some idea may be formed of the importance of railway traffic in that part of the world, when we consider that it takes *two years* or even *two years and a half* for a cargo to accomplish this distrance (435 miles English), owing to stoppages at intermediate ports, insufficiency of water, ice, administrative formalities, and other obstructions.

The works of the Schweinfurt (Bavaria), Bebra, and Fulda (Hesse-Cassel) are to begin shortly, the

negociations between the two governments having been brought to a favourable conclusion.

The François Joseph Eastern Railway of Austria has sent an order for thirty locomotives to a factory at Essling.

The Northern Railway of the Tyrol is certainly to be opened on the 1st October next. The Linz and Passau line will also be finished within the prescribed time.

At Bâle, on the 12th ult. there took place the exchange between the ambassadors of the Grand Duchy of Baden and the N.E. Company of Swiss Railways of the ratifications of the treaty of the 26th August last. This treaty relates to the junction of the railway groups of the two countries at Waldeshut. Previous to this important conference, it was determined by the Confederation that a *permanent* bridge should be built across the Rhine.

The Lyons and Geneva Railway, which unites France with Switzerland and Sardinia, and thereby gives direct communication from Paris to Germany and Italy, was opened on the 16th ult. by a religious ceremony. The Bishop of Belley gave the accustomed benediction to the locomotives, to the directors, and the officials; also to the workmen, who had behaved very well in the work of difficulty in that rough country. The French engineers of section received the cross of the legion of honour.

The commission appointed by the French Government have recommended that the following works are necessary, for three objects, to be inquired into before seriously undertaking the projected tunnel between Dover and Calais:—

1. To take the vertical relative dispositions of the different formations lying in the axis of the straits; to verify the exact levels and inclination of the stratification of the Jura formation under the English shore in the direction of the proposed tunnel.

2. To measure, by pumping apparatus, or other means of exhaustion (*au moyen d'appareils d'épuisement*), the relative force of the aqueous beds existing, or possible to exist, in the interstices of these strata, all of which dip towards the English shore.

3. To make, by competition, the experiment of steam-engines for boring rocks rapidly in tunnels, in attacking, by *steel*, without the aid of powder, the hard and soft resistances, and so solve the question of the probable duration of the work necessary for the completion of the tunnel.

THE LATE ACCIDENT IN GILBERT-STREET AND BUILDING MATTERS.

THE public generally are much indebted to you on building matters, whether it be on "sanitary" or on building "reform;" while the press generally, though not slow to avail themselves of the amount of information to be found in your pages, are not always so prompt in acknowledging the services that have been rendered, or in correcting the errors from want of positive and exact information which they may have unintentionally circulated after their fallacy has been proved by you.

It is the fashion,—the notion is a common one,—to impute most of the disasters that occur in buildings to the district surveyor. If a building is half-timbered too, he is blamed, although in the first matter he has no power whatever, in the second very little: the real offender, the builder, escapes. Again, woodwork is improperly placed in a wall too near a flue, possibly running into it: hearths are not of solid, incombustible materials, of the full thickness of 7 inches, as required, but bedded on timber: the real offender, the builder or his men,—he may have been deceived by his men,—escapes. And, let me ask, is the surveyor Argus-eyed, and is he a ubiquitous individual, that he can so narrowly watch many works going on simultaneously at many houses? If the design be to deceive the surveyor or the master, the men have ample opportunities and facilities, from which no amount of supervision on the part of the surveyor can protect the public.

A piece of wood or plate, as you say, is improperly fixed in a wall or flue, covered up or plastered over. The work is done when the surveyor has left. He is, perhaps, if the matter be recent and discovered, summoned before a magistrate, who, in a wholly mistaken view of the matter, lets him off; or the matter goes on for years, and is only discovered on a fire occurring, when the real offender escapes, and the surveyor is blamed for trusting to men's promises, and for not doing an impossibility.

On the late fire permit me to add a suggestion to the crudities that have appeared in the daily press, one notable expedient being to destroy the greatest guarantee of public safety,—the integrity of party-walls, and have openings of communication in them; the other to insist on trap-doors. When the difficulty, even under the most favourable circumstances, of drawing rusty bolts in a trap-door, and finding perhaps a broken ladder, are added to the confusion and alarm of a fire, it is not a means of escape that can be made immediately available.

A perfectly simple mode adopted by the late Mr. Cubitt in Belgravia and by myself is to continue the staircase right up through the roof, opening with a dormer door on to it, and thus affording a ready access to it right or left.

PAULATIM.

LEEDS.

THE foundation-stones of two important buildings have just been laid at Leeds, and a third new building opened.

The ceremony of laying the foundation-stone of the new workhouse at Burmantofts, and also of the chapel in connection with it, took place on the 5th inst.

The workhouse, which is to be built from the prize plan of Messrs. Perkin and Backhouse, of Leeds, is designed to harmonise with the Industrial Schools, and is in the Elizabethan style of architecture. Its frontage will face Beckett-street, and will be in a line with the Industrial School. This plan will give the appearance of both establishments being one complete building. The chapel, a cruciform structure, will be erected in the centre of the ground betwixt the schools and the workhouse, and is in the Byzantine style. It will be surmounted by a tower on the south side, in which it is proposed to place a clock, with quarter bells. The chapel will be fitted up with open pews, and in the transept two galleries will be erected, to accommodate 200 children. In the rear of the chapel, at the south-west end of the principal building, is the infirmary; and contiguous to it, but totally separate and distinct, are the idiotic and fever wards. The workhouse itself will be built to accommodate 810 paupers—360 males and 450 females, and it is contemplated that the whole will be complete in about two years.

The foundation-stone, or rather one of the corner-stones, of the new Grammar School, Leeds, was laid on Tuesday in last week, by the Bishop of Ripon. The site of the building, which, with the playground, covers 8 acres, is situated on the south-east side of Woodhouse-moor. The land has been purchased for 3,000*l*. The building will contain a residence for the head master, besides the rooms necessary for the school. The two principal school-rooms will be 95 feet long and 28 feet wide, lighted by large windows on both sides, and at one end, at a considerable height from the floor, and will accommodate 200 boys each. They will be placed one over the other. A library and lecture-room, each 25 feet square, will also be provided, as well as cloak-rooms and other accommodation. A stone staircase will give access to the upper school-room, the floor of which will be carried by strong wrought-iron beams. The building will be entirely faced externally with stone, the plain walling being executed in Potternewton stone, and the windows, string courses, and other architectural features in stone, from the Weetwood quarries. The style of architecture adopted by the architect (Mr. Edward M. Barry, of Westminster) is Gothic, of the Decorated period. The windows are ornamented with small columns and tracery heads. The sides of the school-rooms display buttresses and dormer windows, and all the roofs are of a high pitch, and covered with slates of different colours. The upper school-room will have an open timber roof.

The works were let a short time ago to the late Mr. Hall, builder, and will be carried on by the executors, under Mr. Whiteley, and the estimated cost is about 10,000*l*. of which it is intended to raise 7,000*l*. by subscripiton. The foundations are already constructed, and the building may be finished by the 1st of October, 1859.

The new National Schools in connection with the parish church have been completed and opened. The designs were prepared by Messrs. Dobson and Chorley, of Leeds, architects, under whose superintendence the work has been executed. The building includes a boys', girls', and infants' school. It is erected upon a plot of ground on the south-east side of the parish church, and occupies altogether about half an acre of ground. The buildings comprise—on the ground floor, infants' school, 57 feet by 18 feet, and 39 feet 4 inches by 35 feet, with lavatories to the same, also covered and open play-grounds for boys, girls, and infants. On the first floor are boys' school, 76 feet by 18 feet, and 37 feet 9 inches by 18 feet, with class-room and library, 38 feet 6 inches by 16 feet; girls' school (also on the first floor), 76 feet by 18 feet, and 52 feet by 18 feet, with class-room, 18 feet by 16 feet. Ante-rooms are screened off from both the boys' and girls' school, and fitted up complete as lavatories and cloak-rooms. The school-rooms are in the shape of the letter L. There is a lecture-room, 39 feet 6 inches by 16 feet, communicating with the girls' school, and having a separate staircase and entrance at the north-west corner of the building. There is a washhouse and cooking kitchen in connection with the girls' school, fitted up complete. The schools are capable of accommodating 937 children, allowing 9 superficial feet to each child. The whole of the schools have separate entrances. The tower at the north-east angle contains the staircase and entrance to boys' school and play grounds. There are three teachers' residences. The building is in the Perpendicular style, in harmony with the church, the materials used being brick and stone dressings. The upper part of the tower is used as a foul air extracting flue. The following were the contractors for the various branches of the work:—Mr. Thomas Whiteley, stonemason, Woodlouse; Messrs. Swale and Brown, bricklayers, St. Peter's-square; the late Mr. Thomas Hall, carpenter and joiner, Harper-street; Mr. John Garlick, plumber and glazier, Crown-street; Mr. Charles Proctor, plasterer, Woodhouse; Mr. Samuel Croft, slater, Water-lane; Mr. W. Nelson, painter, Briggate; and Messrs. Singleton and Tenant, ironfounders, Briggate.

The cost of the building will be nearly 6,700*l*. The subscriptions raised have been aided by a Government grant of 2,700*l*.

MASTERS AND MEN.

MANY have written much on the subject of the advantages of a good mutual understanding existing between employer and employed: they cannot over-rate them were such the case. But, alas! how opposite they are; and until the retarding causes are removed, their writing is all in vain; they do not know where the evil lies. "A Workman," I have no doubt, could enlighten you very much in these matters. Do not imagine, sir, we desire *equality*. We do not envy the successful capitalist. He has a right to all the profits which he gains by the exercise of his capital and skill; but we do desire to be recognised as the means of bringing about these results, and treated accordingly. Deeds are better than words. Let our employers *show* us they have an interest in our welfare: let our homes be built more for our comfort: let our wives be better fitted (by their mothers) for the duties they will have to perform;—then, and not till then, shall we gain self-respect; quit the excitement, light, warmth, and comfort (?) of the gin-palace or pot-house (and which we cannot always get at home), and become better members of society.

AN OPERATIVE.

IMPROVEMENT OF TOWNS.

IN the number of your journal dated March 27, you favoured me by the insertion of some remarks on the above subject, under the heading of "Bottle-necked Thoroughfares." Allow me to add, in continuation, some practical suggestions as to the means of carrying out this object.

It would be well for each town to have its "society for the improvement of the town," which society should invite the inhabitants from time to time to contribute to that object, at the same time pointing out to them the advantages which would arise from so doing. People would be more willing to subscribe to the funds of such a society than to submit to the involuntary taxation of borough and county rates, which are often insufficient for the purposes required.

The first object to which the society should turn its attention is the purchase and improvement or rebuilding of dilapidated house property, as the society would thereby permanently endow itself, and become less dependent on future subscriptions and donations, and would be enabled to effect every year some of those improvements which would bring any pecuniary return to the society, but which would benefit the public generally; such as paving unpaved streets, and providing parks, gardens, and public walks. One thing much wanted in provincial towns is public baths. These have been erected in London partly from subscriptions, and now are self-supporting. Cleanliness is especially necessary to the health and consequent energy of the people, and a good scrubbing would perhaps put a little of that pluck so much wanting into the sleepy, unprogressing

inhabitants of some of our neglected and decaying old country towns.

The society might also advance money to inhabitants who wished to take out patents, on condition of the patent articles being manufactured in the town, as the reputation of mental industry would thereby attach itself to the town. And for similar reasons the society should assist as much as possible in bringing out and upholding the literary talents of the inhabitants, which object would be greatly advanced by the publication of a magazine bearing the name of the place. Corporations can sometimes do a great deal. The corporation of Carlisle have done so much in improving that city and its vicinity, and by making public walks, that people of independent fortune are flocking to it as a residence. As a single example of public spirit (not the less worthy of remark on account of its apparent insignificance), some swans, the property of a farmer in the neighbourhood, escaped, and chose the Eden river as their swimming-bath. The proprietor, observing their preference for city life, gave them to the city, and (which shows how one act of public spirit will evoke another) the corporation appointed a warden for them at a good annual salary. The Government might do much by offering the franchise to some of those towns which, not being boroughs, should make most improvements within a given time; or, on the same conditions, offering a premium to be laid out in some way beneficial to the inhabitants. But it is best for the people to take an interest in their own town, independent of any such inducements. W. SCARGILL.

CHURCH-BUILDING NEWS.

Newport (Essex).—The tower of the fine old parish church of Newport, built about 800 years ago, has been restored. The materials are rubble, encased with flint, with Caen stone dressings. Nine windows are entirely new: they are in the Early English style. The west door is antique in character, with carved bosses, and gargoyles in keeping with the original. The height of the tower is 98 feet from the floor, the summit having four octagonal turrets. There were formerly five bells; but it is intended now that there shall be six. The length of this church is 144 feet from east to west, and the transepts 98 feet wide. The present works have been done under Mr. G. E. Pritchett, architect, and Mr. W. Brown, of Lynn, was the contractor for the building of the tower, which is now completed. The clerk of the works was Mr. Whitehead.

Chelmsford.—The contract for building the new Independent Chapel, in Baddow-road, Chelmsford, has been taken by Mr. S. Balderstone, of Ipswich, at 1,408*l.* and the old materials. The new chapel is to be erected from designs of Messrs. Poulton and Woodman, of Reading, architects.

Hersham (Surrey).—The circular chapel in this parish, erected in 1844, has been remodelled, repewed, an end gallery and external porch erected, the latter of Gothic design, about 18 feet to the apex of the gable. The roof and floor are covered with blue and red terro-metallic tiles, in alternate courses. The gallery is provided with a stone staircase. The roofs are pierced in the centre for ventilation, and surrounded by a rib, receiving the converging ribs, and stained and varnished. The benches are all moveable, having chamfered ends and sunk bevelled backs, all let into framed mitred and chamfered sills, stained and varnished, and of different lengths, the aisles being of curved form, to afford an increase of accommodation. The whole of the works have been finished by Mr. Charles Pratt, builder, under the superintendence of Mr. J. G. Stapelton, jun. the architect. The building was re-opened on Good Friday.

New Windsor.—The Established Church portion of the new cemetery has been consecrated. The approach to the cemetery has been widened. The entrance consists of ornamental oak-framed folding gates, with iron scroll-work introduced in the various compartments. The gates are hung to two ornamental piers of stone, and on the sides of the piers are flank dwarf walls of pierced stone-work, each opening being filled with ornamental iron-work. The lodge is close to the entrance. It is a building harmonising in style with the entrance and the chapels. Near to the lodge is a small mortuary receiving-house. The whole of the buildings are constructed of Kentish ragstone in random masonry, with Bath stone dressings, and are in the Decorated style of Pointed or Gothic architecture. The ground contains about five acres, of which nearly three acres at the east or end entrance have been consecrated. The Episcopal Chapel has a nave and chancel, the extreme external length being 37 feet 6 inches, and the width 17 feet 8 inches. A robing-room is attached to the north side, and from the junction of this projection with the north wall rises the tower and bell-loft, above which the spire rises to a height of 60 feet above the ground. The east and west windows are adorned with geometrical tracery, and the side windows present considerable variety of design. Internally, the roofing is open. The Dissenters' Chapel is a plain parallelogram in plan, of about the same area as the Episcopal Chapel, with a vestry on the south side and an open timbered porch with ornamental barge-boards in the north. The east and west windows are filled with tracery, and over the former the gable is terminated with a crocketed finial of considerable relative altitude. The fittings are of the same character as in the Episcopal Chapel. The designs for the buildings and laying out of the grounds were produced by Messrs. Poulton and Woodman, of Reading, architects. The whole of the works have been carried out under contract with Mr. Strong, of Windsor. The planting is in course of execution by Mr. Whomes, of Windsor, and the ornamental iron-work of the entrance has been supplied by Messrs. Wellman.

Stoke, near Guildford.—The small west gallery is about to be removed, and a new one erected, extending the whole width of the nave and aisles, for the accommodation of the increased number of children who attend the large schools recently erected, from the designs of Mr. T. Goodchild, Guildford, architect, who is to carry out the proposed gallery. It is also in contemplation to remove the organ, which now obstructs the view of the handsome west (perpendicular) window, and to place it over the vestry upon the south side of the chancel.

Boughton Monchelsea.—The following tenders were received for the works connected with the erection of a new parsonage-house in this parish: Punnett, Tunbridge, 1,684*l.*; Bradshaw, Maidstone, 1,535*l.*; Spicer, Strood, 1,480*l.*; Tompson, Maidstone, 1,295*l.*; Sutton, Walter, and Goodwin, Maidstone (accepted), 1,287*l.*

Bristol.—Mr. Hatherly, the active honorary secretary of the Commercial Auxiliary Association, has lately received the sum of 20*l.* from Mr. J. S. Brymer and Mrs. Brymer, of Bath, to restore the columns of the church of St. Mary Redcliff. It is suggested that if twenty-eight subscribers of a similar amount could be induced to come forward, the whole of the aisle columns could be renovated. Mr. Hatherly and his friends have also obtained 80*l.* towards the memorial window to the late Mr. and Mrs. Hall, for which 100*l.* are required.

Taunton.—The opponents of the proposal of the churchwardens for taking down and rebuilding the tower of St. Mary's Church, and raising 2,000*l.* by way of a rate towards the expenses, have taken the opinion of Mr. C. J. Foster, LL.D. on the subject, who advises, "that the vestry has no power by law to entertain the proposal of the churchwardens." A subscription has been commenced for opposing the rate.

Bowdon.—It is intended to commence, as soon as possible, the erection of a plain temporary brick building, to accommodate 800 persons, to be used whilst the work of restoring the church is going on. The restoration is to be begun when the temporary building is ready for occupation. It is calculated that the restoration will be completed about October, 1859. The plans include the heightening of the tower, 14 feet 6 inches, and the lengthening of the building, as well as the addition of transepts. The restored church will seat 1,134 persons, and an addition will be made to the present rather limited number of free seats.

Scarborough.—The screen which has so long concealed the chancel of the parish church of Scarborough is at length removed, and the east window (Dr. Harland's gift) is again seen in all its proportions. The crumbling plaster has at same time been removed, and the surface of the stone wall restored to its original state. A reredos has been erected, the groundwork of which is formed by coloured tiles, of Mediæval pattern, by Minton; surmounted by a carved stone cornice, consisting of vine-leaves and wheat-ears,—with text. The roof of the chancel has been decorated,—the ground being azure, with gold stars; the ribs and cornice picked out with gold, introducing oak-leaves and roses, &c. Mr. Dove, of Scarborough, has executed the carving; the whole being under the direction of Mr. E. Christian.

Ely.—The foundation-stone of the new Wesleyan chapel and schools to be erected at Ely was laid on Wednesday, the 7th instant, by Mr. E. Ball, M.P. The buildings will be plain; erected with bricks and Ancaster stone. The works are being carried out under the direction of Mr. Freeman, at an estimated cost of about 1,100*l.*

Miscellanea.

PRACTICAL TEACHING.—On Saturday, the 27th of March, Professor Donaldson went with his classes of architecture and construction to Covent-garden Theatre, by the permission of the architect, Mr. Edward Barry, who accompanied the party over the works, showed them the drawings, and described the peculiar points in the arrangements and construction. The pupils, we need scarcely say, were much gratified by the courtesy of Mr. Barry, and the information and experience which they gained by their visit to this important edifice.

THE EXHIBITION OF 1861.—The Council of the Society of Arts have resolved, "That the institution of decennial exhibitions in London for the purpose of showing the progress made in industry and art, during each period of ten years, would tend greatly to the encouragement of arts, manufactures, and commerce." "That the first of these exhibitions ought not to be a repetition of the Exhibition of 1851." And "That the Council will proceed to consider how the foregoing resolutions can be best carried into effect."

THE BORDEAUX FOUNTAIN COMPETITION.—A correspondent asks for information as to the result of the competition for a monumental fountain at Bordeaux, a notice of which competition appeared in the *Builder* of the 27th of June, last year. Perhaps some friend at Bordeaux will let us know what has been done.

PUBLIC WORKS AT ADELAIDE, SOUTH AUSTRALIA.—The review of public works is divided by Mr. Davenport, late commissioner of public works, into five sections, namely, waterworks, magnetic telegraph, harbour trust, colonial architect's department, and central road board. The whole of the working surveys for the waterworks by last review had been for some time completed, at a cost of 1,100*l.*; and contracts for iron pipes to the value of 75,000*l.* had been taken. Valves, sluices, lead, &c. had also been ordered from England to the amount of 12,750*l.* According to a statement since made by the commissioners of waterworks, works have been undertaken towards carrying out the scheme to the amount of 115,498*l.* The water, it is now determined, shall be collected by a system of surface drainage, whereby 80,000*l.* will be saved out of the contemplated outlay of 280,000*l.* The working of the magnetic telegraph is declared in the review to be extremely satisfactory. The estimated receipts for 1857 were put down at 500*l.* but they had reached 791*l.* by the end of June only. In the colonial architect's department numerous works have been and are being carried out, such as the custom-house at Robe, court-houses at Redruth and Gawler, additions to the Legislative Council Chamber. These and other works commenced and completed in 1857 cost 5,047*l.*; and others then completed, but previously begun, cost 3,296*l.* On works still in progress, including the new Adelaide Hospital, additions to lunatic asylum, Cape Northumberland Lighthouse, &c. 25,199*l.* had been expended in 1857. For works projected and proposed, but not yet begun, 16,240*l.* were required. The total amount of Government expenditure on public works and improvements during the first half of 1857 was 199,151*l.* The total amount during 1856 was 410,312*l.*; and during 1855, 306,369*l.* It was estimated that the total probable expenditure of 1857 would be 442,785*l.*

BUILDING WORKS AT SYDNEY, IN AUSTRALIA.—Among the new structures that are making progress in Sydney, are St. Andrew's Church of England Cathedral, St. Mary's Roman Catholic Cathedral, St. Philip's Tower (to receive a peal of eight bells (given by Mr. John Campbell), "splendid" buildings for the Bank of Australasia, the English, Scottish, and Australian Chartered Bank, and the Oriental Bank, an observatory, and the bridge to the suburb of Pyrmont, now separated from the city by Darling harbour.

BRIDGES OVER THE BOYNE.—Mr. Gibbons, C.E. says the *Drogheda Argus*, has approved of the designs and plans of the contemplated bridges over the Boyne, as furnished by Mr. Bowers, C.E.

WHAT MULTIPLICATION WILL DO.—In the statement you have quoted from the *Messenger* in respect of the calculation of dropping a pin the first visit, and doubling each following visit for fifty-two times (p. 239) to the *Leviathan*, there is an error. I make the figures to be as follows, viz.:—The first ten weeks, 1,023,—the paragraph says, 512; and on the 52nd, 4,503,599,627,370,495,—the paragraph says, 2,251,799,813,685,248; and of course the weight is more than double; likewise the number of ships to carry them would be in the same ratio. F. DUNBAR.

THE LATE MR. ALEXANDER BLACK'S LIBRARY. Few men were better known or respected in Scotland than the late architect to George Heriot's Hospital, and the tribute paid to his professional abilities, judgment, and benevolence, by an eminent member, at a recent meeting of the Architectural Institute, must have been highly gratifying to his numerous friends. His library, which has been sold, was rich in architectural and engineering works, and included many illustrated books connected with the fine arts and general literature.

CLOUD PAINTING.—No feature in nature offers perhaps so many striking beauties as the ever-changing clouds, tinged with every possible shade of colour, according to the particular position the glorious sun may hold, and the state of the atmosphere. The clouds that have hitherto figured on the painter's canvas have been generally tame productions, giving but a feeble *portraiture* of their real presence. By the aid of photography this blemish may be removed, and we may hope to see landscapes in which the most beautiful feature, the celestial canopy, may form—not a mere subordinate part, but a main feature in this class of paintings. At the time of taking such photographs the varying lines may be easily marked upon a rough sketch, and afterwards painted on the photograph at leisure.—TASSIEL.

BUILDING ACCIDENTS.—The danger connected with temporary buildings was exemplified recently at Halifax. A wooden structure was erected over a portion of the Piece Hall, capable of holding 8,000 persons, in which Mr. Spurgeon preached to about 5,000. A few hours afterwards the building was crushed in by the weight of snow which had fallen, and the benches broken to pieces, the timbers smashed, and the large tent of the Halifax Horticultural Society, which formed the covering of the building, was rent into shreds. Had this taken place about three hours earlier, no doubt scores of people would have been injured. On the previous evening, when the congregation were dispersing, a portion of the large wooden gallery gave way, and a young man and a young woman were precipitated with others amongst the fallen timber, each sustaining a fracture of the leg.—— During a very high wind at Preston last week, a small erection adjoining the main building of Messrs. J. Haywood and Sons' spinning and manufacturing establishment, in Ribbington-lane, was blown down. The building consisted of a lapping and other rooms, and was two stories high. One man was buried among the ruins, and nearly suffocated. The building destroyed was of very slight construction.

TEMPLE-BAR: "WHAT SHALL WE DO WITH IT?"—Sir: In the event of Temple-bar being removed, I think that, by reason of its being a work—though an inferior one—of Wren's, and because of its historical associations, it would be a great pity to destroy it altogether. If it were converted into an entrance to Victoria-park it would still in some measure retain its connection with east London.—IPSTA.

A MANCHESTER ACADEMY OF ART.—The collection of Art-treasures in Manchester has given new life to a scheme long ago projected and postponed—the foundation in that city of an Academy of Art, the laws of which are already framed. It is to consist of academician associates and students. No limit is to be placed on the number of members, and ladies are to be admitted to each class.

A MINE OF GLASS.—The *California Chronicle*, published at San Francisco, says:—"We have in our possession several specimens of glass taken from a hill situated about sixteen miles from the town of Napa, and on the creek of that name. The article possesses all the characteristics of glass, being both brittle and translucent. Those well acquainted with the properties of glass state that the only operation necessary to make good marketable glass out of the article under consideration is to extract the small quantity of oxide of iron it contains. The hill or mountain from which the glass is obtained seems to be composed almost entirely of this material, and is capable of supplying the whole world for many years."

SUBMARINE CABLE TO AMERICA.—I do not doubt but that you have had many plans proposed to you for laying the submarine cable to America, as there was a failure last year. I should suggest having two ships, the one to follow the other; the latter to have the cable payed out over it; the ships to be kept at a distance apart according to the strength of the cable, merely paying over some pullies. Then there would be *more slack*, and it would give the machinery a better chance; and on the second ship there might be a brake applied in case of an accident, to hold the end from going to the bottom. HENRY TAYLOR.

Albany, New York, U.S. America.

NEW PAPER FILE.—An improvement in paper files has been registered by Mr. J. Faulkner, of St. Martin's-le-Grand. The point of the file is protected by a shield, and both file and shield are affixed to a metallic plate, with holes for screws, so that it can, if required, be screwed to a desk or wall. The guard must be useful in preventing accident from the point of the file.

THE EARL OF CAITHNESS'S PAVEMENT WORKS AND INVENTIONS.—An account of the Caithness pavement quarrying and manufacture is given in the *John O'Groat's Journal*, from which the following particulars, chiefly as to the Earl of Caithness's new works and inventions, have been gleaned. The principal works in the county of Caithness are at present those attached to the quarries of Mr. Traill, Castle-hill, Mr. Sinclair, Forss, Mr. Adam, Lynegar, and Mr. Craig; and at the first of these—Mr. Traill's—a series of machines has for some time past been driven by water, while both by Forss and by Mr. Craig, it is believed, steam-engines are at present in course of erection. The works at which most enterprise, or at any rate ingenuity, has been exhibited are, however, those lately erected at Barrogill by the Earl of Caithness. The works referred to have been established in connection with the quarries lately opened on the Mey estates, near Barrogill Castle, the seat of the earl. The stone is removed from the quarries, a distance of two miles, to the works, where they are cut, dressed, polished, or otherwise prepared, for pavement, floors, jambs, mantelpieces, &c. There are saws, polishers, and dressers here worked by machinery impelled by steam. The dressing-machine is most worthy of note. It consists of a set of vertical parallel bars of metal, arranged in suitable guides in a substantial framing, and furnished at their lower ends with steel or hardened metal cutting or reducing edges. From each of these bars protrudes an adjustable stud arm, and as the shaft revolves, a number of cams, disposed helically upon it, strike the arms on the other side, and so raise up the operating cutters to a predetermined height, when they are allowed to drop in succession upon the face of the stone under operation, and thus chip or cut away the material to the required extent. While the cutting bars are thus operating, the stone being dressed is also caused to traverse at a slow rate beneath them. There is also a polishing apparatus, and three double sets of saws or cutting-machines. In all there are seven machines in the different departments, all subordinate to one shaft, worked by an engine of 10-horse power, made by Messrs. Forest and Barr, of Glasgow. There is a new pier at hand for easy export to market.

DR. ARNOTT'S PLAN FOR VENTILATING AND WARMING BUILDINGS.—"A Governor of the York County Hospital," in a letter to the *York Herald*, in reference to what he calls a "puff" by Dr. Arnott, in the *Times*, on the subject of his plan of ventilation, adopted in the York County Hospital and elsewhere, says:—"The more the medical men have seen of its workings the less they will like it, and I believe that its entire removal is now under consideration. Instead of answering all the purposes for which it was erected, it has turned out a complete failure, for a difference of ten degrees in the temperature of the different wards has often been noticed, and has often baffled the skill of those who attempted to restore something like a uniformity of heat in the hospital. As a ventilating power, it has also been found very deficient, and additional means have had to be used to keep the hospital in a salubrious state."

THAMES TUNNEL.—In the week ending April 10th, 21,170 passengers passed through the tunnel, and paid 88*l.* 4s. 2d. in tolls.

THE MERTHYR SURVEYORSHIP.—Mr. J. W. Harrison has been re-appointed surveyor to the Merthyr Tidfil Board of Health.

TO SURVEYORS.—Sir: Will one of your able correspondents favour me with replies to the following questions?—1. How is the ink made that is used for writing on maps, and which retains a deep black and glossy appearance? 2. Is there any instrument in use among land surveyors by which the areas of small irregular strips of ground may be measured off from the map,—more particularly such strips as may remain, supposing you to first draw and ascertain the area of some regular figure *within* the boundaries of the enclosure, leaving the area of the irregular projecting portions to be afterwards ascertained? 3. What is the best kind of mounted paper to use for plotting a parish map, upon 4 ft. 6 in. by 3 ft. 6 in.; and can such be had without joint? 4. What is the readiest method of making a *fac-simile* of such a map; also on mounted paper (not tracing)?

SILVIO.

LIVERPOOL ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETY.—The thirteenth meeting for the session of this society was held on Wednesday night, 7th inst. The paper for the evening was by Mr. F. Howard, "On Conventionality of Art."

DEPARTMENT OF ART.—The Queen has sent the presents of the King of Siam for public exhibition at the Museum of the Department, at Brompton, and Lord Palmerston has added to them the Siamese sword of state which was presented to himself.

ROMAN REMAINS AND NEW BUILDINGS AT CHESTER.—In excavating for new buildings opposite the Feathers Inn, Bridge-street, several bases of columns of Roman character have been discovered at the depth of 4 feet below the surface. They are in their original position, forming a colonnade, placed four yards apart, resting on large blocks of stone 12 inches thick. The new building will be brick, with white stone dressings, in the Mediæval style of fourteenth century, presenting a gable to the street, and having a projecting bow-window to the room over the row. A shop, in Bridge-street-row, is also to have a new front of timber work, characteristic of Chester in the fourteenth century. Mr. James Harrison is architect to both buildings.

TENDERS.

For Warehouse, No. 93, Wood-street, and Bull's Head-passage, Cheapside. Mr. William G. Bartleet, architect.

H. Lee and Son	£2,106 0 0
Ashby and Sons	1,998 0 0
Gammon	1,917 0 0
Piper and Son	1,887 0 0
Rider	1,785 0 0
F. and F. J. Wood (accepted)	1,783 0 0

Alterations and additions to the Mansion, Mount Echo estate, Chingford, for J. D. Waters, Esq. Mr. Herbert Williams, architect. Quantities not supplied.

Turner and Sons	£1,048 0 0
Crutch	954 0 0
Chesham	939 0 0
Holding	877 0 0
Fuld	837 0 0

For repairs to Farm Buildings and Cottages on the estate of Colonel Goulbourn, at Betchworth, Surrey. Mr. Muggeridge, Dorking, architect.

Holdsworth, Reigate	£995 0 0
Carruthers	975 0 0
Fisher	974 0 0
Batchelor, Betchworth	896 0 0

For repairs of Nutfield Church, Surrey.

Carruthers, Reigate	£347 0 0
Barnes, Nutfield	487 0 0
Fisher, Reigate	474 0 0

Additions and alterations at the Bull Inn, Kingsland. Messrs. Finch, Hill, and Paraire, Architects. Quantities not supplied.

R. Lawrence and Son	£689 0 0
Elston and Son	570 0 0
Hodges	568 0 0
Turner and Sons	499 0 0

For the erection of the *Suffolk Chronicle* Offices, at Ipswich. Mr. R. M. Phipson, architect. Quantities not supplied.

Cornish	£430 0 0
Gibbons	388 0 0
Baldeston	385 0 0
Luff	379 0 0
Girling (accepted)	350 0 0

TO CORRESPONDENTS.

S. S.—W. H. C.—A. P.—W. T.—W. D. M.—M. S.—R. F.—J. B.—E. R.—W. H.—A. P.—J. J. W.—British Art (shall appear).—C. F. H. Mr. G.—A. P.—W. P. G.—W. C.—A Subscriber.—E. H. (Varnish ought not to produce such an effect; but we cannot venture on an opinion).—Messrs. T.—R. M. P.—R. B. E.—S. H. (is an advertisement).—W. M.—J. D.—Practicalist—E. H. E.—C. B.—J. H.—H. S.—J. W.—W.—B. S.—G. N. D.—J. A.—J. P.—W. G.—J. W.—G. H.

"BOOKS AND ADDRESSES."—We are forced to decline pointing out books or finding addresses.

☞ *NOTICE.—All Communications respecting Advertisements and Subscriptions should be addressed to "The Publisher of the Builder," No. 1, York-street, Covent-garden. All other Communications should be addressed to the "Editor," and* NOT *to the "Publisher."*

Post-office Orders and Remittances should be made payable to Mr. Morris E. Coleman.

ADVERTISEMENTS.

"THE BUILDER."—Wanted, the Numbers or Part for JANUARY, 1857.—Apply at the Office of "The Builder."

Third and Cheaper Edition, in 8vo. price 42s. cloth,

GWILT'S ENCYCLOPÆDIA of ARCHITECTURE, Historical, Theoretical, and Practical: Illustrated with more than 1,000 Engravings on Wood by R. Branston, from Drawings by J. S. Gwilt: with a Supplement on Gothic Architecture.

"It should be possessed and used by every architectural student."—*Builder.*

London: LONGMAN, BROWN, and CO.

In One Volume, with above 3,000 Woodcuts, price 63s.

ENCYCLOPÆDIA of CIVIL ENGINEERING, Historical, Theoretical, and Practical.

By EDWARD CRESY, Architect and Civil Engineer.

Second Edition, revised; with a Supplement, comprising the Metropolitan Water Supply, Drainage of Towns, Railways, Cubical Proportion, Brick and Iron Construction, Iron Screw Piles, Tubular Bridges, &c.

"A desideratum in engineering science is supplied by this remarkable volume. There is not a member of the profession, from the most eminent civil engineer to the humblest surveyor, who will not find here the materials to enrich his mind and extend his knowledge. All that is known of engineering science in its history, its theory, and its practice, from the patriarchal ages down to the present day, is here spread out as on a picture, as clear and comprehensive in its principles as it is minute and satisfactory in its details. We are astonished that a single mind could traverse so wide a field, and compress into a single volume all past knowledge and experience on a subject that historically commences with the mole of Tyre, and terminates with the modern canal and railroad."—*Railway Gazette.*

The Supplement may be had separately, price 10s. 6d. cloth.

London: LONGMAN, BROWN, and CO.

NEW EDITION OF FAIRBAIRN'S INFORMATION FOR ENGINEERS.

In crown 8vo. with Plates and Woodcuts, price 10s. 6d. cloth,

USEFUL INFORMATION for ENGINEERS: being a Series of Lectures delivered to the Working Engineers of Yorkshire and Lancashire, with a Series of Appendices, containing the Results of Experimental Inquiries into the Strength of Materials, the Causes of Boiler Explosions, &c.

By WILLIAM FAIRBAIRN, F.R.S. F.G.S.

Second and cheaper Edition, thoroughly revised.

"Mr. Fairbairn's name is a guarantee for the soundness of this work. It treats of steam, fuel, and boilers,—the working classes, as they will one day be called; with an appendix on wrought iron,—which will be called the workman's jacket-stuff. Though a professional book, it is as much adapted for the general reader as such a book can be."—*Athenæum.*

London: LONGMAN, BROWN, and CO.

NEW AND GREATLY IMPROVED EDITION OF GALBRAITH AND HAUGHTON'S MANUAL OF ARITHMETIC.

The Third Edition (Seventh Thousand), thoroughly revised, and containing 1,500 Exercises; in fcp. 8vo., price 2s.

MANUAL of ARITHMETIC.

By the Rev. J. A. GALBRAITH, M.A. and the Rev. S. HAUGHTON, M.A.

Fellows and Tutors of Trinity College, Dublin.

In the present edition of the "Manual of Arithmetic," the authors, without departing from their original plan, have availed themselves of the valuable suggestions of several experienced teachers. Various new rules are introduced; an improvement has been effected in the typographical details. Many new exercises on the Chain Rule are given; also a greatly simplified method of stating complex questions under the Double Rule of Three. The Tables of Foreign Money, Weights, and Measures exhibit the currency, &c. in actual use abroad; and the whole subject of Foreign Exchanges and Arbitration of Exchange is now treated for the first time with an approach to completeness in an English school arithmetic. The Answers to the Exercises have been thrown together at the end, so as to be easily detached from the book if desirable to promote the pupil's progress or insure his mastery of the rules.

London: LONGMAN, BROWN, and CO.

Just published, price 4s. 36th edition, for 1858,

LAXTON'S BUILDER'S PRICE-BOOK,

containing 11,000 Prices and Memoranda, withan ILLUSTRATED APPENDIX, containing prices and description of new materials and inventions recently introduced, and the Metropolitan Building Act, with notes of cases explanatory of its law and practice.

13, Warwick-court, Holborn; and 19, Arundel-street, Strand.

Just published, in 8vo. cloth, price 5s.

SCUDAMORE ORGANS; or, Practical Hints respecting Organs for Village Churches and small Chancels, on improved principles.

By Rev. J. BARON, M.A.

With Five Designs by G. E. STREET, F.S.A. and Six Suggestive Ancient Examples.

This is intended as a hand-book of facts and principles for the use of architects and others in arranging with an organ-builder the size, shape, and position of an organ for a small church. It shows how, by due attention to some of the most important principles of acoustics and organ-building, hitherto commonly ignored, organs may be rendered more truthful and effective, their size and price greatly reduced, an organ-chamber, or even supporting corbels, rendered unnecessary, and the several essential parts arranged so as to harmonize with the other features of the building.

"A most valuable and instructive little book."—*Ecclesiologist*, April, 1858, p. 92.

London: BELL and DALDY, 186, Fleet-street; and all Booksellers.

Sent free by post for eighteen penny stamps,

EIGHT PRACTICAL LECTURES on ARCHITECTURE, with numerous illustrations. Extra cloth, gilt.

Also CHALK'S PEEP into ARCHITECTURE, for twenty-four stamps.

Address, W. DREW, 40, Adelphi-terrace, Old Ford-road, London, N.E.

THE FREEMASONS' MAGAZINE and MASONIC MIRROR for APRIL 14th, 1858, is now ready. Price Sixpence.

CONTENTS:—

I.—THE GRAND OFFICERS.
II.—ANCIENT WRITERS AND MODERN PRACTICES.
III.—POETRY.
IV.—ROBISON ON FREEMASONRY.
V.—TIDINGS FROM THE UNITED STATES.
VI.—CORRESPONDENCE.

THE MASONIC MIRROR.

The Girls' School.—Metropolitan Lodges.—Provincial Lodges.—Royal Arch.—Mark Masonry.—Knights Templar.—Scotland.—Colonial.—The Week.—Public Amusements.—Obituary.—Notices and Answers to Correspondents.

London: HENRY GEO. WARREN, 2, Red Lion-court, Fleet-street; and GEO. ROUTLEDGE and CO. Farringdon-street.

WHAT WILL THIS COST TO PRINT?

is often a thought passing through the minds of literary and public characters, and persons of benevolent feelings. Apply as under, and you will receive every information required. Every description of Printing, Engraving, Lithography, and Bookbinding executed.—RICHARD BARRETT, Mark-lane, London.—Established 25 years.

NOTICE.—To TIMBER MERCHANTS, MAHOGANY MERCHANTS, CABINET MAKERS, and OTHERS.—The next LIVERPOOL PERIODICAL AUCTION SALES, comprising SIX CARGOES of MAHOGANY, viz.:—Two Cargoes Mexican Mahogany, Two Cargoes St. Domingo Mahogany, One Cargo Porto Plata Mahogany, One Cargo Cuba Mahogany, Havana Cedar, and Lancewood Spars, and other furniture woods, &c. will take place on THURSDAY morning, the 29th instant, at ELEVEN o'clock precisely, and the following day, in the WOOD SALES SHEDS, Brunswick and Toxteth Docks, Liverpool.—Catalogues, containing full descriptive particulars, may be had on application to EDWARD CHALONER, Timber Broker and Measurer, No. 6, east side Queen's Dock, Liverpool.

VOTES for SURREY and MIDDLESEX.—Freehold Building Land, Norwood, and Dwelling-house, City of London.

MR. J. W. WARD is instructed to SELL by AUCTION, at the MART, on WEDNESDAY, APRIL 21st, at TWELVE, in nine lots, PLOTS of FREEHOLD BUILDING LAND, with frontages of from 16 to 28 feet, most desirably situate in Ernest-street, Elder-road, Norwood, Surrey, adjacent to the church and the station of the West-end Crystal Palace Railway, and within three minutes' walk of the new station; also, a substantial brick-built Freehold Dwelling-house, 1, Ball-court, Jewry-street, in the City of London, producing a rental of 16l. per annum.—Particulars and conditions of sale may be had of JOSEPH LILLEY, Esq. Solicitor, Blackman-street, Southwark; at the Mart; at the King's Head Tavern, Norwood; and at the Offices of the Auctioneer, 7, Dean's-row, Walworth-road

BARNES-COMMON, SURREY.—Excellent Residences, Cottages, and Building Land, with immediate possession.

MR. W. H. HEWITT has received instructions to SELL by AUCTION, at the MART, on TUESDAY, MAY the 11th, in lots, an eligible COPYHOLD ESTATE, consisting of Four capital Residences, Cottage Tenements, and Building Land, lying in a ring fence, most delightfully situate on Barnes-common, commanding beautiful views over the surrounding country, and within three minutes' walk of the Barnes Railway Station. The property, except the cottage tenements, is in hand, and is of the estimated value of upwards of 400l. per annum.—May be viewed, and printed particulars with plans of the property and conditions of sale, may be had shortly at the Mart; at the principal Inns at Barnes, Mortlake, and Putney; of W. D. VAWDREY, Esq. Solicitor, 2, Bedford row; and at Mr. W. H. HEWITT'S Auction and Land Agency Offices, 23, Hart-street, Bloomsbury-square.

HAVERSTOCK-HILL.—Valuable Plot of Freehold Building Land.

MESSRS. FAREBROTHER, CLARK, and LYE are instructed to SELL, at GARRAWAY'S, on WEDNESDAY next, APRIL 21, at TWELVE, a very desirable plot of FREEHOLD BUILDING LAND, situate at the extreme end of the Malden-road, with a frontage thereto of about 250 feet, also a frontage of 240 feet to the Southampton-road, leading to Haverstock-hill, through the Orphan Working School Estate; containing nearly two acres, and forming part of an ancient enclosure known as Gospel Oak Field, abutting on and near to Haverstock-road, Circus-road, Prince of Wales-avenue, and Oakfield-crescent. This very eligible plot of land is beautifully situate, commanding capital views, and is nearly the only unappropriated plot in the neighbourhood, and is admirably adapted for the erection of dwelling-houses and shops, or presents a good site for a public building or institution requiring space. The Malden-road is about to be connected with the Circular-road formed through St. John's-park, and will have a direct communication with Hampstead.—Particulars and plans may be had of Messrs. LE BLANC, DAY, PRIDEAUX, and SMALE, Solicitors, New Bridge-street, Blackfriars; at Garraway's; and at the Offices of Messrs. FAREBROTHER, CLARK, and LYE, 6, Lancaster-place, Strand.

HIGHGATE-HILL.—Very valuable Freehold Estate, comprising a capital old-fashioned Family Residence, with Stabling, Gardens, and Paddocks, the whole comprising about six acres, full of sand and brick earth, and, from its position, one of the most important and valuable building sites in the vicinity of London.

MESSRS. FAREBROTHER, CLARK, and LYE are instructed to prepare for SALE, at GARRAWAY'S, on WEDNESDAY, the 26th day of MAY, 1858, at TWELVE o'clock (unless an acceptable offer be in the meantime made by private contract) in one lot, a very valuable FREEHOLD ESTATE, situate on Highgate-hill, at its junction with Maiden-lane, and close to the town; comprising a capital old-fashioned family residence, containing dining and drawing rooms, numerous bed-rooms, and servants' offices, stable-yard, with coach-house, stabling, and brewhouse; adjoining the residence is a conservatory, opening to the lawn and pleasure-grounds, kitchen-garden, and paddock, with pond of water, the whole containing about six acres. The views from the property over London are most extensive, and from the great frontage, both to Highgate-hill and Maiden-lane, presents one of the most eligible building sites. The estate is full of brick earth and sand, and, being raised, the whole might be easily converted to bricks prior to building on the property. May be viewed by cards only, which, with particulars and plans, may be had of D. HUGHES, Esq. Solicitor, Gresham-street, City; at Garraway's; and at the Offices of Messrs. FAREBROTHER, CLARK, and LYE, Lancaster-place, Strand.

TO PARENTS AND GUARDIANS.

WANTED, by a Land Surveyor, in extensive practice, and who holds important appointments, an ARTICLED PUPIL.—Apply to Mr. WILLIAM S. KINDER, 18, John-street, Bedford-row.

TO CARPENTERS AND JOINERS.

WANTED, in the Country, a PERSON to SELECT and CUT OUT STUFF for JOINERS, and fill up time at the bench, or mortising machine.—Address to M. F. Office of "The Builder," stating wages, and last employment.

TO CARPENTERS.

WANTED, a GOOD HAND: one that has been used to building greenhouses, &c.—Apply to Mr. CATCHPOLE, Erith, Kent. A reference will be required.

WANTED, by a Country Builder, a WORKING SHOP FOREMAN. State age, salary, and where last employed.—Address, F. M. N. Office of "The Builder."

WANTED, a first-rate FRET LEAD GLAZIER. To one who is a steady and good workman, good wages will be given.—Apply to N. W. LAVERS, 30, Southampton-street, Strand.

WANTED, by a Manufacturing Firm in the country, a PERSON qualified to SUPERINTEND a BUSINESS connected with the Building trade. A thorough knowledge of business, and taste in decorative designing, indispensable.—Address, M. G. Post-office, Troubridge, Salop.

WANTED, a YOUNG MAN, in an Architect's Office, a quiet, willing Clerk, and to make himself generally useful.—Address, stating terms and proficiency, to B. M. at Mr. Scripps's Newspaper Office, South Molton-street, Bond-street.

TO ARCHITECTS' ASSISTANTS.

WANTED, a First-rate DRAUGHTSMAN, thoroughly competent to design buildings of various descriptions, in the Gothic and Classic styles of architecture.—Address (stating salary required), ALPHA, Post-office, 98, Jermyn-street, S.W.

TO MASTER PLUMBERS.

WANTED, by a respectable Young Man, a SITUATION as PLUMBER'S LABOURER. Wages moderate, if permanent.—Address, A. G. Hope Coffee-house, 5, New Rochester-row, Pimlico.

WANTED, by a practical and experienced Millwright, Engineer, and Machinist, a SITUATION as FOREMAN, to superintend either in a manufactory or a mill. No objection to the country. Satisfactory references can be given.—Address, by letter, to A. B. No. 10, Platt-terrace, Old St. Pancras-road, King's-cross, N.W.

TO BUILDERS AND SEWER CONTRACTORS.

WANTED, by a Young Man, aged 26, practically acquainted with bricklaying, a SITUATION. Thoroughly understands sewer and drainage works, time-keeping, &c.; or he would take work by the piece. Good testimonials.—Address, T. T. L. Office of "The Builder."

TO ARCHITECTS AND SURVEYORS.

WANTED, by the Advertiser, who has been six years in the profession, a SITUATION, either in town or country. Good recommendation.—Address, M. C. 15, Addison-road North, Notting-hill.

TO BUILDERS, MASONS, &c.

WANTED, by the Advertiser, a SITUATION as WORKING FOREMAN of STONE-MASONS. Practically acquainted with stone-work in all its branches, and has been extensively engaged in the entire superintendence of men for the last fifteen years.—Satisfactory references from last employer.—Address, X. T. 18, Ranelagh-grove, Pimlico.

TO PLUMBERS, ENGINEERS, AND OTHERS.

WANTED, by a first-class PLUMBER, a constant SITUATION, in town or country. Has a good knowledge of hydraulic and deep-well pump work, in all its branches. No objection to fill up his time with gas-fitting, &c. First-rate references if required.—Address, J. C. L. No. 40, Greek-street, Soho-square, London.

TO ENGINEERS AND SURVEYORS.

WANTED, an ENGAGEMENT, by a qualified ASSISTANT SURVEYOR. Good reference, Aged 22.—Address, Z. X. Mechanics' Institute, Derby.

TO YOUNG ARCHITECTS.

WANTED, by a GENTLEMAN, with a good general practice, a JUNIOR PARTNER. This would suit any gentleman having lately completed his articles. He would have unusual opportunities of improving himself, and a liberal income for a moderate premium.—Address to T. S. Office of "The Builder."

WANTED, a SITUATION as CLERK of WORKS, in an engineer's, timber-merchant's, or builder's establishment, by a Young Man, who is practically conversant with the above; would be glad to make himself generally useful; understands measuring, &c. and is quick at accounts.—Address, ALFRED, 3, Linton-street, New North-road, Islington, N.

TO PLUMBERS AND BUILDERS.

WANTED, by the Advertiser, a SITUATION as PLUMBER. No objection to fill up time in glazing or painting. In town or country. References can be had.—Address, J. S. 5, Pearson-street, Kingaland-road, Shoreditch.

WANTED, a RE-ENGAGEMENT, as General, Out-door, or Shop FOREMAN. Has been these last eight years superintending extensive jobs. First-class references. Carpenter by Trade; aged 36.—Address, B. W. X. Office of "The Builder."

YOUTH WANTED, in the OFFICE of a SURVEYOR, in the City, who can write a good hand. Instruction to be considered equivalent to his services.—Apply to K. L. Mr. Ramsey, Builder, 36, Walbrook.

TO ARCHITECTS AND SURVEYORS.

THE Advertiser undertakes the PREPARATION of DESIGNS from rough sketches or written particulars. Has had much experience in Gothic work, fair working, and detail drawings. Perspectives got up and tinted in the first style. Terms reasonable.—Address, G. A. Office of "The Builder."

TO ARCHITECTS AND OTHERS.

THE Advertiser, accustomed to perspective, tinting, and the general work of an office, wishes an ENGAGEMENT. Can give satisfactory references as to ability, &c.—Address, WILLIAM HUE, 26, Newland-street, Pimlico.

TO ARCHITECTS, SURVEYORS, AND BUILDERS.

THE Advertiser requires a RE-ENGAGEMENT, as JUNIOR CLERK, in a Surveyor's or Builder's Office. Has a knowledge of land surveying.—Address, E. C. Office of "The Builder."

METROPOLITAN BOARD of WORKS.—ELECTION of DISTRICT SURVEYOR, under the Metropolitan Building Act, 1855.—The Metropolitan Board of Works hereby give notice, that they will, at their meeting on FRIDAY, the 23rd day of APRIL instant, at TWELVE o'clock at noon, at Guildhall, in the City of London, proceed to the ELECTION of a DISTRICT SURVEYOR for the DISTRICT of the NORTHERN DIVISION of ST. MARYLEBONE.—Applications in writing, with certificates of competency, addressed to the Board, will be received at their Office, No. 1, Greek-street, Soho, until THURSDAY, the 22nd instant, at FOUR o'clock p.m. and Candidates are requested to be in attendance at the meeting of the Board on the day of election.

E. H. WOOLRYCH, Clerk of the Board.

1, Greek-street, Soho, April 10, 1858.

TO BUILDERS.

EMPLOYMENT WANTED, in a Builder's Office as CLERK of WORKS, or to take charge of a small business, by an active middle-aged Man, who has a thorough practical knowledge of building in all its branches: can take out quantities, estimate, measure up, and value works, fixtures, and dilapidations, and wishes to make himself useful. Unexceptionable references for integrity and ability. Salary moderate. No objection to the country.—Address, pre-paid, to J. C. care of Mr. Clarke, 10, Norfolk-street, Middlesex Hospital.

DOUCEUR.—FIFTY POUNDS, or more or less in proportion, will be given for an APPOINTMENT of 150l. per annum in a Government, Banking, or other Office in London. References to present principals, and also to parties of the highest respectability.—Address, A. BOLLAND, Post-office, Liverpool.

BUILDER'S CLERK.—WANTED, by a Builder of small practice, a Young Man as CLERK, who has been accustomed to the business. He will be required to keep the same hours as the men, have a thorough knowledge of drawings, be a good accountant, capable of measuring work, and taking out quantities expeditiously.—Address, C. W. Office of "The Builder," stating age, qualifications, and amount of salary required.

A THOROUGHLY Practical CLERK of WORKS wishes a RE-ENGAGEMENT. Good references as to character and ability.—Address, J. B. 11, Weston-place, King's-cross, London.

TO ENGINEERS, SURVEYORS, AND CONTRACTORS.

A GENTLEMAN of respectability is open to an ENGAGEMENT as ENGINEERING SURVEYOR and LEVELLER. He is also a good draughtsman. Unexceptionable references.—Address, A. D. Z. Post-office, 4, Portsdown-terrace, Kilburn, N.W.

AN OUT-DOOR APPRENTICE Wanted, by a Grainer.—Address, by letter, F. C. 8, Euston-grove, Euston-square, N.W.

A CLERK of WORKS (a thoroughly practical Man, who can prepare plans, sections, elevations, and detail drawings, and is well versed in construction and Gothic details) requires a RE-ENGAGEMENT as CLERK of WORKS or ASSISTANT to an ARCHITECT.—Address, ALPHA, 12, East-road, City-road, Hoxton.—Unexceptionable testimonials.

TO ARCHITECTS.

A YOUNG MAN, whose Articles have recently expired, is open to an ENGAGEMENT. He is a good ornamental and perspective draughtsman, and fair colourist, and generally acquainted with the duties of an office.—Address, A. B. care of Mr. Flower, 25, Lawrence Pountney-lane, Cannon-street, E.C.

A BUILDER'S FOREMAN wishes for an ENGAGEMENT. Is a Carpenter by trade, and is well versed in all branches connected with buildings, having had the sole superintendence of many large jobs, alterations, waterside works, &c. References good, locality no object. Terms moderate.—Address, J. B. No. 2, Newington-place, Kennington-road.

TO MASTER BLIND-MAKERS.

A PRACTICAL BENCH HAND and SPRING MAKER wishes for an ENGAGEMENT as SHOP FOREMAN. Has a thorough knowledge of measurement, fixing, and setting out work in the above line. Age, 36.—Address, B. M. at Mr. Savage's, 71, Admiral-terrace, Vauxhall-road.

A GENTLEMAN is desirous of a RE-ENGAGEMENT in an Architect's Office. He is a neat and expeditious draughtsman, accustomed to perspective and working drawings, specifications, and the measurement of artificers' work. Salary, 100l. per annum.—Address, A. X. Z. Robey's Post-office, Hammersmith, W.

TO LARGE CONTRACTORS FOR DOCKS, RAILWAYS, &c.

A FIRST-CLASS ENGINEER is open to an ENGAGEMENT. He is thoroughly capable of carrying out dock work, railway works, and extensive public buildings requiring experience and ability; also of furnishing all plans, working drawings, &c. References of the highest respectability.—Address, C. Q. Office of "The Builder."

TO ARCHITECTS.

AN ARCHITECTURAL DRAUGHTSMAN is in want of IMMEDIATE EMPLOYMENT. He has been eleven years in the profession, and, having been in business himself, is competent to take the entire management of an office in the absence of the principal.—Address, A. B. C. Post-office, Throgmorton-street, London, E.C.

TO ARCHITECTS AND OTHERS.

A FIRST-RATE ARCHITECTURAL DRAUGHTSMAN and clever DESIGNER, having time unoccupied, would be glad of an ENGAGEMENT. Salary moderate. The Advertiser has been regularly educated to the profession.—Address, O. R. Office of "The Builder."

TO ARCHITECTS AND DECORATORS.

AN ARTIST, of considerable experience in designing and decoration, is desirous to obtain an ENGAGEMENT to EXECUTE the several BRANCHES of the DESIGNING and DECORATIVE ART. Unexceptionable testimonials, and of the highest respectability, will be given, on applying to W. C. A. at the Post-office, 6, Brecknock-place, Camden New Town, N.W.

TO BUILDERS, CONTRACTORS, &c.

A YOUNG MAN (20 next July), who writes a good hand, is clever in architectural drawing and generally well educated, and who for the last four years has learned and practised carpentry, in which he is well advanced, desires a SITUATION as ASSISTANT to a BUILDER, SURVEYOR, or CONTRACTOR. Salary not a primary object.—Address, J. A. R. Post-office, Ramsgate.

TO GRAINERS, WRITERS, AND GENERAL DECORATORS.

A THOROUGHLY competent and experienced Hand in the above branches may hear of a permanent SITUATION.—Applications by pre-paid letter, stating age, qualifications, and salary required, to W. O. S, Clifton-terrace, Southampton, will be attended to. One who can superintend men, and will make himself generally useful in house-painting, will be preferred. Specimens will be required, and an unexceptionable character of one year, at least, from the last employer.

TO ARCHITECTS AND BUILDERS.

A YOUNG MAN, 30 years of age, returning from the Continent, who has been superintending a large building there, wants an immediate ENGAGEMENT upon his arrival in England next week, either as CLERK of WORKS or BUILDER'S FOREMAN. He is acquainted with the construction of the Turkish Baths. Salary a secondary consideration.—Address, R. H. D. Office of "The Builder."

A FIRST-RATE DRAUGHTSMAN, DESIGNER, and COLOURIST is open to an ENGAGEMENT; has been employed in an eminent architect's office; understands Gothic and Classic ornament, perspective, &c. Can take out quantities, measure up works, and is thoroughly acquainted with all office duties. Small salary required. London preferred.—Address, A. R. S. Office of "The Builder."

TO ARCHITECTS.

A THOROUGHLY Practical CLERK of WORKS is desirous of a RE-ENGAGEMENT. Is fully qualified to superintend the erection of any extensive works, or manage an estate. With first-class testimonials. Locality no object.—Address, A. N. T. Office of "The Builder."

TO ARCHITECTS, DISTRICT SURVEYORS, AND GENTLEMEN OF PROPERTY.

A SURVEYOR, accustomed to the charge of a district under the Metropolitan Building Act, experienced in the management of property, a good draughtsman, and quick at accounts, and used to most branches of the profession, is open to an ENGAGEMENT, occasional or otherwise. Remuneration moderate.—Address, Mr. J. BRAMWELL, 5, Derwent-terrace, Spa-road, S.E.; or 33, King-street, Southwark.

A GENTLEMAN, who has had considerable experience in a First-class Survey, is open to an ENGAGEMENT. He is a neat and expeditious draughtsman. Terms moderate. Excellent references.—Address, C. Z. Post-office, Derby.

PARTNER WANTED.—The Proprietor of an old-established and increasing business, closely connected with the Architectural Embellishments in Stone, Plaster, &c. wishes to meet with a Gentleman to take a MOIETY of the same, fully competent to correspond, with a knowledge of the profession, capable of making estimates, &c. to be an active and honourable man of business. The present owner will undertake the management of the practical departments.—For particulars, apply to Mr. E. L. CURTIS, Surveyor, No. 8, Union-court, Old Broad-street, City, by letter, or personally.

TO ARCHITECTS AND SURVEYORS.

PARTNERSHIP. — A GENTLEMAN, aged 27, engaged in railway and sanitary engineering, trigonometrical town surveys, &c. possessing also a knowledge of architecture, is desirous of obtaining a SHARE in a well-established practice. Address, A. Z. 165, Aldersgate-street, London, E.C.

MATHEMATICAL DRAWING INSTRUMENTS.—JOHN ARCHBUTT, 20, Westminster-bridge-road, Lambeth (8.), near Astley's Theatre, begs to call attention to his Stock of Instruments manufactured by superior workmen. The prices will be found considerably lower than ever charged for articles of similar quality and workmanship. Rules, scales, tapes, &c. at equally low prices. An illustrated price-list will be immediately forwarded, free, on application.

N.B. A few New and Second-hand Levels and Theodolites always on Sale.

SURVEYING, LEVELLING, and CIVIL ENGINEERING. — PRACTICAL FIELD INSTRUCTION is given in Surveying, Levelling, Civil Engineering, &c. by Messrs. HYDE, SMITH, and LEWIS, Civil Engineers, Surveyors, &c. of extensive practice, who give Instruction in every branch of the Profession.—Terms for the Course of Three Months, Two Guineas. No extras.—For Prospectuses, &c. apply at the Offices, 24, Guildford-street.

ARCHITECTURAL and ENGINEERING DRAWING CLASSES, for Architects, Builders, and Engineers' Sons, Assistants, Clerks of Works, &c. Established by Messrs. HYDE, SMITH, and LEWIS, Architects, Civil Engineers, &c. for giving DAY and EVENING INSTRUCTION in Architectural, Engineering, and Mechanical Drawing; Perspective, Isometrical, and Geometrical Drawing; Making Finished and Working Drawings; Preparing Specifications, Taking out Quantities, Estimating Builders' Work, &c. Terms:—Day Pupils, Three Guineas per Quarter; Evening Pupils, One Guinea per Quarter. There are no extras: the Terms include the whole of the above, with the use of Drawing Boards, T-Squares, Plans, Drawings, Models, &c.—Prospectuses, and full particulars may be had at the Offices, 24, Guildford-street, Russell-square, London.

BIELEFELD'S PAPIER MACHE ENRICHMENTS.—To ARCHITECTS, BUILDERS, DECORATORS, &c.—Just published, Part IV. of the second volume of Enrichments, price 3s. comprising many new designs in centre flowers, trusses, mouldings, &c. and Supplement to Tariff of Flowers and Ventilators, price 1s. 6d. containing many new designs; also Parts I. II. and III. of second volume of Enrichments, price 3s. each; Tariff of Flowers and Ventilators, price 3s. 6d.; and the first volume of Enrichments, price 20s.

The Works, 15, Wellington-street North, Strand.

COMPETITION and OTHER DRAWINGS.—A good DRAUGHTSMAN and COLOURIST OFFERS his SERVICES in Preparing General Finished, and Perspective Drawings, for competition or private works.—Address, ALPHA, Miller's Library, Little College-street, Westminster.

MESSRS. BELLRINGER and PILBEAM, ARCHITECTS and SURVEYORS, of 18, Adam-street, Adelphi, W.C. continue to Prepare Plans, Specifications, &c. Tracings and Quantities taken.

MESSRS. BUTLER and DYER, PHOTOGRAPHIC ARTISTS, No. 26, WALNUT-TREE WALK, Lambeth, S.—Public Buildings, Mansions, Statues, Sculpture of all kinds, Carriages, Furniture, Chimney Pieces, Machinery, &c. Photographed at the following Low Prices:—

Size.	Mounted on Card. First Proof.	Extra Copies each. Unmounted.	Ditto on Albummized Paper.
inches.	s. d.	s. d.	s. d.
6 by 4 ..	3 0 ..	0 6 ..	0 8
8 by 6 ..	5 0 ..	0 10 ..	1 0
10 by 8 ..	8 0 ..	1 4 ..	1 6
12 by 10 ..	12 0 ..	2 0 ..	2 3

FREDERICK DENT, Chronometer, Watch, and Clock Maker to the Queen and Prince Consort, and maker of the great clock for the Houses of Parliament, 61, Strand, and 34, Royal Exchange. No connection with 33, Cockspur-street.

AN Unlimited SUPPLY of SPRING WATER from the Chalk, can be had within Twenty Miles of London.—Address, M. Post-office Romford, Essex.

WANTED, to PURCHASE a SECOND-HAND SLATE-SAWING MACHINE.—Price and particulars to be forwarded, pre-paid, to M. N. care of Mr. Meall, Bookseller, &c. Quay, Yarmouth, Norfolk.

BUILDING PLOTS at LEWISHAM and SYDENHAM.—TO BE LET by TENDER, on BUILDING LEASES for ninety-nine years, several PLOTS of GROUND, situate at Lewisham, Kent, close to the junction station of the North-Kent and Mid-Kent Railway at Lewisham; also at Sydenham, Kent, near the Forest-hill Station, both estates being part of Matthew Hill's Estate. A form of Tender, with plan, may be obtained at the Office of Mr. SAMUEL FISHER, Solicitor, Merchant Taylors' Hall, Threadneedle-street, London, where Tenders, under seal, are to be delivered on or before TUESDAY, the 4th day of MAY, 1858, by TWO o'clock in the afternoon, and the same will then be opened, and the parties tendering will be expected to attend.—Forms of Tender, with plans, may also be obtained of Mr. THOMAS MILLS, Surveyor, 28, York-street, Westminster; also upon payment of 1s. at the Roebuck Inn, on the Estate at Lewisham; and at the Dartmouth Arms Inn, near the Estate at Forest-hill.

TO BUILDERS of VILLAS.—TO BE LET, SEVERAL ACRES of LAND, in plots, in the most choice situation at Snaresbrook, two minutes' walk from the Station, on the Woodford Railway to Fenchurch-street. The soil is gravel, and the ground covered with splendid evergreens.—Applications are on hand for houses on lease, to pay, exclusive of ground-rent, about 7 per cent.—Apply to Mr. NOBLE, Surveyor, Woodford; or to Mr. NISSEN, at 43, Mark-lane, London.

FREEHOLD.—TO BE SOLD, within three miles of St. Paul's, on the south side of the Thames, about NINE ACRES of most valuable FREEHOLD BUILDING LAND, with a good family residence. The property is peculiarly eligible for the erection of villas, or tenancies of houses. The soil is gravelly, and sewers and roads have lately been made up to the boundary of the estate. The adjoining land is all let for building purposes, and is now partly covered. The houses hitherto built have commanded an immediate tenancy.—For further particulars, and to inspect the plans, apply to Messrs. GREGORYS and CO. No. 1, Bedford-row, W.C.

SALE of GROUND-RENTS.—CITY IMPROVEMENTS, New Cannon-street, Crooked-lane, New Earl-street, Bread-street, St. Mary-at-Hill, and St. Paul's Churchyard, in the City of London.—The Committee for Improvements within the City of London hereby give Notice, that they will meet at GUILDHALL, London, on MONDAY, the 19th day of APRIL next, at ONE o'clock in the afternoon precisely, to receive TENDERS in writing from parties willing to PURCHASE sundry GROUND-RENTS of Premises in the above situations.—Particulars and conditions of sale, with forms of Tender, and further information, can be obtained upon application at the Comptroller's Office, Guildhall. MERREWETHER.

Guildhall, London, March, 1858.

DULWICH WOOD. — BUILDING GROUND.—Eligible PLOTS of LAND for building villas upon this property, in the immediate neighbourhood of the Crystal Palace, and of the Gipsy-hill Station, on the West-end Railway, may now be obtained.—Apply, between the hours of Ten and Four, to Mr. HART, Accountant's Office, Crystal Palace, from whom plans and particulars may be obtained.

HAMPTON COURT. — In Matham-road, near the above station, several eligible BUILDING PLOTS TO BE LET. Advances to respectable parties.—Apply to Mr. F. LETT, Architect, 36, Essex-street, Strand.

FREEHOLD GROUND, MAIDENHEAD-COURT.—The Commissioners of Sewers of the City of London hereby give Notice that they will meet in the GUILDHALL of the said city on TUESDAY, the 11th day of MAY next, to receive PROPOSALS for taking on Building Leases, for eighty years from 24th June next, at a ground rent, certain PLOTS of GROUND, situate in Maidenhead-court, Aldersgate-street.—Further particulars may be had and plan seen on application to Mr. HAYWOOD, Engineer to the Commissioners, at these offices, where forms of proposal may also be obtained. The Commissioners will require plans and elevations of the premises proposed to be built to be submitted to them for approval, and do not bind themselves to accept any proposal, unless deemed advantageous. Persons tendering must attend on the above day, and the party whose offer is accepted will be required to execute an agreement at the time.

Sewers' Office, Guildhall, JOSEPH DAW, Principal Clerk.
31st March, 1858.

TO BUILDERS.—VOTE for LONDON.—TO BE SOLD or LET, on a Building Lease, a PLOT of FREEHOLD LAND (west to east, north side, 45 feet; south ditto, 40 feet; north to south-west front, 24 feet; east front, 23 feet); the site of the house formerly No. 14, Fetter-lane, Fleet-street.—For particulars apply to Messrs. NICHOLS and CLARK, Solicitors, 9, Cook's-court, Lincoln's-inn.

TO BUILDERS or Parties requiring extensive PREMISES, near the City.—The LAND opposite the Elephant and Castle, Newington, within one mile of London-bridge, containing a frontage of 500 feet, TO BE LET, by the Fishmongers' Company, on building leases, by TENDER, on the 21st day of APRIL next.—For particulars, apply to Mr. W. B. FOWSE, the Company's Clerk, Fishmongers'-hall, London-bridge; or at the Office of Mr. RICHARD SUTER, the Company's Surveyor, 23, Fenchurch-street.

FREEHOLD BUILDING LAND, situate in the Queen's-road, Richmond-hill (land-tax redeemed), belonging to the Vestrymen of the parish of Richmond, TO BE LET in plots for a term of ninety-nine years, at low ground-rents, for the erection of detached or semi-detached villas. The roads and sewers are made. Particulars and plan of the ground may be obtained on application to Mr. R. BREWER, Surveyor, 8, Hill-street, Richmond, S.W. where a draft of the proposed leases may be seen.

HOUSES WANTED to PURCHASE.—A Gentleman wishes to PURCHASE HOUSE PROPERTY, Freehold or Leasehold. Small houses not objected to, or advances would be made on the same for short periods, without the expenses of mortgage deeds.—Apply to Messrs. SEYMOUR and CO. 24, Martin's-lane, Cannon-street, City.

TO BUILDERS and OTHERS.—Hargraue Park Estate, Upper Holloway.—The Trustees of this highly eligible FREEHOLD PROPERTY are prepared to entertain offers for the SALE or LEASE of BUILDING PLOTS on liberal terms. Houses built on adjacent property command both ready tenants and purchasers.—For particulars apply to R. L. ROUMIEU, Esq. 10, Lancaster-place, Strand; or to P. A. HANROTT, Esq. 36, Southampton-row, Russell-square.

WATERSIDE PREMISES ON THE LEA-CUT, LIMEHOUSE.

TO BE SOLD, or LET on LEASE, these extensive FREEHOLD MANUFACTURING PREMISES, which have been erected but a few years, comprising two ranges of brick-built ground-floor factories, with iron roofs, tiled, lighted with skylights, each building measuring 135 feet by 34 feet; a brick-built factory, communicating, consisting of one lofty ground story 80 feet long by 25 feet wide; lofty square-built chimney-shaft, yard, with five-ton crane; manager's dwelling, and cottage adjoining; four-stall stable, cottage, and large yard. Total area about 30,000 feet. There is an abundant supply of water from a fine deep well sunk on the premises.—For further particulars apply to Messrs. FULLER and HORSEY, Billiter-street, E.C.—The plant, or any portion of it, may be taken at a valuation; or the whole will be removed at the option of the in-coming tenant or purchaser.

TO BUILDERS.—LOWER NORWOOD. TO BE LET, on Building Lease, for 99 years, a PIECE of LAND, with frontage 80 feet by 250, on the High Road from London to Croydon.—For particulars apply by letter to A. B. 210, Tooley-street. N.B. A small portion of Money can be advanced by the freeholder.

FREEHOLD LAND, three miles from Lambeth (land-tax redeemed), 171 feet by 234, suitable for a manufactory, having excellent drainage, and being enclosed by the walls of the surrounding property. Lease 99 years, ground-rent 100*l.* per annum. Or 80 feet will be LET on the same terms, or the Freehold SOLD for 1,700*l.*—Apply to EDWIN CARTER, Auctioneer, Spencer-road, Battersea-rise, S.W.

TO CONTRACTORS, BUILDERS, and BREWERS.—FOR SALE, EIGHT STRONG CAST-IRON COLUMNS (about 15 cwt. each), eleven feet in height and nine inches diameter, with caps and bases. Also Two Fifty-Barrel (three-inch fir) Working Squares, nearly new.—Apply to NEWTON and HORNCASTLE, Auctioneers, Stratford, Essex.

WEYMOUTH, DORSET.—To BUILDING SOCIETIES, CAPITALISTS, and OTHERS.—The opening of the broad and narrow-gauge Railways to the fashionable and now commercial Port of Weymouth, combined with the circumstance that the neighbourhood has suddenly become a Naval and Military Station (immense Government Works being now carried on), thus causing a great demand for house accommodation, has induced the owner of the Bellfield Park Estate (immediately adjoining the town) to devote it for Building purposes. It may, with confidence be asserted, that few properties in England present so many and various advantages. The Estate comprises a Mansion House of an imposing character, very extensive Stabling, beautiful Pleasure Gardens, and a finely Timbered Park and Grounds of more than one hundred statute acres, so charmingly situated that an entire town or hundreds of villa residences may be erected thereon, the rates of which would be 150 per cent. less than in Weymouth. The property, which is about 100 feet above the level of the sea, lies beautifully undulating, and is admirably calculated for drainage. The aspect is due South, and commands views of the stupendous Breakwater at Portland, and Coast Scenery of an ever-varying and interesting character. The soil is dry and healthy, and singularly productive. Water of the purest quality, and never-failing. As an instance of the salubrity of the locality, it may be mentioned that the ages of the two last occupiers averaged 92 years. Turnpike and other roads which intersect the property offer a frontage of more than two miles in extent. Part of the Estate abuts on the Smallmouth Sands (more than a mile in length), which, for solidity, are almost unequalled. The Tenure is Freehold. Without a personal inspection it is impossible to form an adequate idea of the many advantages for Building purposes of this magnificent Property, for which object it has been laid out by artists of great merit, whose plans may be viewed (by cards only), and conditions known, on application to Mr. ROBERT DAMON, House Agent, Augusta-place, Weymouth, Dorset.

OFFICES TO LET, in Parliament-street.—TWO FRONT ROOMS, one about 20 feet by 12, and the other, 15 feet by 11, well lighted. Rent moderate.—For particulars, address A. P. Office of "The Builder."

TO CAPITALISTS and BUILDERS.—HOUSE WANTED.—A liberal Rent, up to the termination of the ground lease (60 years), will be given for a House and Premises, if built at Bridgend, in accordance with a plan to suit the purpose required. 1,000*l.* or 1,200*l.* will be requisite.—Apply, post-paid, to Mr. SMITH, Bank, Bridgend, Glamorganshire.

TO BUILDERS and CAPITALISTS.—At IPSWICH.—TO BE LET, on Building Leases from the Corporation of Ipswich, in plots varying from twenty-five rods to sixty rods, TWELVE ACRES of very desirable BUILDING LAND, part of the Handford-hall Estate, with frontages towards the Colchester and Hadleigh roads, and to the intended new railway station road. First-class villas are in great demand, for which the site is well adapted, commanding views of the Stoke hills and the Gipping valley.—Applications are to be made to Mr. F. BARNES, Architect, Lower Brook-street, Ipswich; or to Mr. W. HUTCHINSON, Soane-street, Ipswich, where plans and particulars may be obtained.

Ipswich, March 8th, 1858.

BUILDING LAND TO BE LET, at Canonbury, Holloway, Norwood (Knight's-hill), Denmark-hill, Camberwell, Peckham, St. John's-wood (Avenue-road), Wimbledon, &c. All the usual facilities to respectable parties.—Apply to ARTHUR ASHPITEL, Esq. Architect; or to JAS. EDMESTON, Jun. Esq. Architect, 5, Crown-court, Old Broad-street, E.C.

TO BE LET or SOLD, with immediate possession, the large and commodious MANUFACTURING PREMISES, situate at Hawley-crescent, Camden-town, and consisting of a spacious and lofty fire-proof hall, 120 feet long and 41 feet wide, two engine-houses and stacks, very extensive workshops and store-rooms, and spacious airy offices, suitable for a large public company. These premises are situated close to the Regent's Canal, have an excellent WHARF, 77 feet long, and are in the immediate vicinity of the goods station of the London and North-Western Railway. The attention of carriage and coach builders, warehousemen, and of public companies, is especially invited to these eligible works.—For particulars apply to the present lessees, Messrs. BOYDELL and GLASIER, on the spot.

FREEHOLD BUILDING LAND.—TO BE LET or SOLD, TEN ACRES, close to Forest-gate Station, having upwards of 4,300 feet of frontage to good newly-made roads. Also, about Twelve Acres, consisting of parts of a larger estate, some of which has been sold for building on, situate within a few minutes' walk of the Carshalton Station. Also, about Six Acres, principally bounded by capital roads, and possessing a frontage of upwards of 2,000 feet, situate at Woodside, within a few minutes' walk of the Norwood Station.—Apply to D. B. SLADEN, Esq. 2, King's Arms-yard, Moorgate-street, E.C.

BUILDING GROUND TO BE LET for third and fourth-rate houses, in the best part of the Parish of Clerkenwell.—Apply to Messrs. WILLIAMS and SMITH, Architects, 52, Old Broad-street, City.

TO BUILDERS, DECORATORS, and UPHOLSTERERS.—TO BE DISPOSED OF, in consequence of the sudden death of the Proprietor, a first-class BUSINESS in the above line, together with the Lease of the Dwelling-house and Premises, which are situated in a leading thoroughfare at the West-end.—For further particulars, apply to Messrs. SIMPSON and DAWS, 163, Strand.

TO BUILDERS, BRICKLAYERS, and PLASTERERS. — An OLD-ESTABLISHED BUSINESS in the above line to be DISPOSED OF, near Holborn, the Advertiser leaving England. — Every information and terms may be obtained on application, by letter, to A. B. at Mr. Dunsmore's, 17, Middle-row, Holborn.

NOTICE. — DRY RUBBISH, free from vegetable matter, may be shot (where directed) within the Royal Arsenal Woolwich.—Application to be made at the Royal Engineer Office at that place.
Royal Engineer Office, Royal Arsenal, Woolwich,
30th March, 1858.

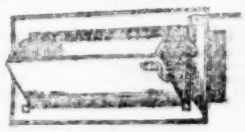
FOR SALE (London made), a NEW TWO-HORSE High-pressure Vibrating STEAM-ENGINE.—To be seen at H. LETHBRIDGE'S, 45, Mary-street, Hampstead-road.

WANTED.—SECOND-HAND MORTAR-MILL, with Working Gear for Horse or Steam Power.—Send price and particulars to Mr. R. BARNES, No. 3, Parliament-street, Westminster.

TO ARCHITECTS and BUILDERS.—
T. TRELOAR, 42, LUDGATE-HILL,
Manufacturer,
SUPPLIES COCOA-NUT FIBRE MATTING, DOOR-MATS, HASSOCKS, &c.
of the best quality on the most reasonable terms.
Warehouse, 42, Ludgate-hill, E.C.

VENTILATION—PURE AIR.

Sheringham's Ventilator for the



admission of Pure Air through an

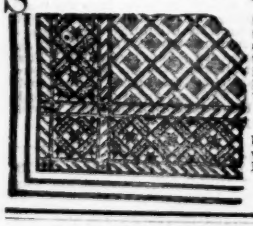
EXTERNAL WALL.

With single pulley, from 6s. each; with leading pulley, from 6s. 6d.
These Ventilators are arranged that the requisite quantity of air may be admitted for the due ventilation of an apartment without the slightest draught being felt by the occupants; and as they are placed in the external wall, their action is not impeded when the house is closed for the evening, at which time a constant supply of fresh air is most required.—HAYWARD, BROTHERS, sole Manufacturers, 196, Blackfriars-road, and 117, Union-street, Borough; and of all respectable Ironmongers, Builders, &c.

SPECIAL NOTICE.
CLERICAL, MEDICAL, and GENERAL
LIFE ASSURANCE SOCIETY,
13, ST. JAMES'S-SQUARE, LONDON, S.W.
Established 1824.
All Persons who effect Policies on the Participating Scale BEFORE JUNE 30th, 1858, will be entitled at the NEXT BONUS to one year's share of Profits beyond later Assurers.
Proposals should be forwarded to the Office before June 20th.
The last Annual Report, as also a statement of the Sixth Bonus declared in January, 1857, setting forth in detail the whole state and affairs of the Office, and especially the benefits which will hereafter accrue to persons now assuring, can be obtained of any of the Society's Agents, or from the Office.
GEORGE H. PINCKARD, Actuary.
GEORGE CUTCLIFFE, Assistant Actuary.
13, St. James's-square, London, S.W.

ACCIDENTS of EVERY DESCRIPTION.
£1,000 IN CASE OF DEATH; OR
A FIXED ALLOWANCE OF 6l. PER WEEK
IN THE EVENT OF INJURY
May be secured by an Annual Payment of 3l. for a Policy in the RAILWAY PASSENGERS' ASSURANCE COMPANY.
A special Act provides that persons receiving compensation from this Company are not barred thereby from recovering full damages from the party causing the injury; an advantage NO OTHER COMPANY CAN OFFER.
It is found that ONE PERSON in every FIFTEEN is more or less injured by Accident yearly. This Company has already paid as compensation for Accidents £7,988.
Forms of Proposal and Prospectuses may be had at the Company's Offices, and at all the principal Railway Stations, where, also, Railway Accidents alone may be insured against by the Journey or Year.
NO CHARGE FOR STAMP DUTY.
WILLIAM J. VIAN, Secretary.
Railway Passengers' Assurance Company,
Offices, 3, Old Broad-street, London, E.C.

PATENT
SOLID PARQUETERIE,



for floors, walls, and furniture (inch thick from 1s. per foot), as used by the eminent architects, Sir Charles Barry, Messrs. Burn, Hardwick, Parnell, G. G. Scott, T. H. Wyatt, &c. &c.

"From its strength, durability, and elegance, well worthy of notice."—Times, May 29.

ARROWSMITH,
No. 80, New Bond-street.

TO PAINTERS, BUILDERS, AND CONTRACTORS.
THE BEST MARKET on the south side of the River, for
GENUINE OLD GROUND WHITE LEAD,
LINSEED-OIL, TURPS, VARNISH, and COLOURS
of every description, is
SIMPSON and CO.'S,
53 and 54, London-road, Southwark.
A price list sent on application.

JOHNS & CO.'S PATENT PERMANENT STUCCO WASH (perfectly non-absorbent), STUCCO, CEMENT, STUCCO PAINT.—CLARK and BENGOUGH, Manufacturers, Grand Surrey Canal Bridge, Old Kent-road.—Office, 4, George-yard, Lombard-street.

THE PORTLAND CEMENT WORKS, NORTHFLEET, KENT.—Messrs. ROBINS and CO. to WHOM THE PRIZE MEDAL WAS AWARDED in 1851, are prepared to supply any quantity of the very best PORTLAND CEMENT, manufactured by them for all the purposes to which Cement is applicable.
Orders received at Great Scotland-yard, and at the Works.

LONDON and WEST of ENGLAND CEMENT WORKS, Dunball, Bridgwater.—Hydraulic, Portland, Bath and Roman Cements, Blue and White Lias Lime, lump and ground.—KLALLMARK and CO. Dunball, Bridgwater, and 9, North Wharf-road, Paddington.

PARIAN CEMENT.—This article is valuable for internal stucco instead of common plastering, and is especially adapted to skirtings, flooring on brick arches, &c. &c. It takes paint in a few hours after its application on walls or laths, is without efflorescence, and may be painted or papered forthwith. A finer quality forms a beautiful scagliola, and polishes with any admixture of colours.—Manufactured by the Patentees, FRANCIS, BROTHERS, and POTT, Cement Works, Nine-elms, London.

PLASTER of PARIS, unequalled in quality and price, manufactured by W. JACOBS, Trent Works, Newark, Notts.

CHARLES RICHARDSON,
BRUNSWICK WHARF, VAUXHALL,
And 6, SOUTH WHARF, PADDINGTON BASIN.
COWLEY and KENT BRICKS, per barge, alongside, or delivered in any quantities, direct from wharfs.
SUPERIOR WHITE SUFFOLK FACINGS, Splays, Door-Jambs, Coping Bricks, Stable Clinkers, &c.
DARK RED FACINGS, Rubbers, Splays, Paving Bricks, &c.
BRIGHT YELLOW MALM FACINGS, and Cutters, of the best quality. Mean and Pale Malm Seconds, Pickings, Paviors, &c.
BLACK HEADERS, Glazed and Unglazed.
BEART'S PERFORATED BRICKS.
STAFFORDSHIRE BLUE VITRIFIED BRICKS, and Channelled Stable Bricks. Red, Blue, and Buff Terro-Metallic Paving Tiles. Plain, flanged, rolled-top, and ornamental grooved Ridging, &c. Broseley Tiles.
WHITE GLAZED BRICKS.
FIRE GOODS, Newcastle, Stourbridge, and Welsh Fire Bricks; Tiles, Lumps, Fire Clay and Fine Linings, any Pattern Brick, &c. made to order.
TERRA-COTTA CHIMNEY-POTS, Vases, Trusses, Garden Border Edging, &c.
SLATES, best quality from the Bangor quarries.
YORKSHIRE STONE. Tooled Paving, Sills, Steps, Sinks, Coping, &c.; Sawn Slab for Hearths, Jambs, &c.
TILES—Pan, Plain, Ornamental Roofing, Paving, Oven, Mathematical, &c. A great variety of Red and White Goods always kept in Stock.
GLAZED VITRIFIED SEWAGE PIPES, Closet Pans, Syphons, Stench Traps, &c.
GREY STONE and CHALK LIME.
BLUE LIAS LIME, Ground, or in Lump, from Stockton, Wilmcote, Leicester, or Aberthaw.
CEMENTS, Roman, Portland, Parian, Lias, Bath, Keene's, &c.
PLASTER of Paris, fine and coarse, of best quality, at reduced prices.
HAIR, Laths, Sand, Ballast, &c.
IMPORTER OF DUTCH CLINKERS.
All kinds of Building Materials sent by rail the same day as ordered.
ROAD MATERIALS — Guernsey Granite, Kentish Flints and Kentish Rag Stone, broken and unbroken.
Tenders given for any quantity.
N.B. Landing Wharf and Drawing Dock at Vauxhall.

BLUE LIAS LIME.—Messrs. GREAVES and KIRSHAW having completed their Works on the Birmingham and Oxford Line of the Great Western Railway, at Harbury, are now prepared to supply LUMP and GROUND LIME of the best quality, direct from the kilns, to all the Stations on the Great Western Railway. Greaves's Blue Lias Lime. Portland, Bath, and Lias Cement.
Works at Harbury, Stockton, and Wilmcote.—Office at Warwick.

O. M'CARTHY, CARMAN, and SAND and CEMENT MERCHANT, Whitefriars Wharf, Whitefriars, Fleet-street, City. Sand from above or below Bridge, delivered by the yard or per barge. Ballast, screened or unscreened, by the yard or per barge. Stocks, Lime, and Old Bricks. Dry Rubbish delivered, per barge, in any quantity, alongside the Thames.

CEMENT.—ROMAN and PORTLAND CEMENTS, and PLASTER of PARIS, manufactured by C. J. HILTON, can be had in any quantity, wholesale and retail, at his Wharf, 6, Upper Thames-street, London; and also at the Manufactory, Faversham, Kent.
N.B. These Cements supplied for shipment, on advantageous terms.

ARTIFICIAL HYDRAULIC or PORTLAND CEMENT combines the valuable qualities of the natural Cements with the additional advantage that it greatly excels them in its cementitious properties; that it is not affected by frost, and does not vegetate in damp situations. Account of COMPARATIVE EXPERIMENTS on the strength of this and other Cements (read at the Institute of Civil Engineers), to be obtained from the Makers, JOHN BAZLEY WHITE and BROTHERS, Millbank-street, Westminster, who prepare one quality only of Portland Cement.

ATKINSON'S CEMENT, so long known and esteemed in London for plastering purposes, is a quick-setting Cement, that requires no colouring. Sold exclusively by JOHN BAZLEY WHITE and BROTHERS, Millbank-street, Westminster; and Seel-street, Liverpool.

GEO. and THOMAS EARLE, CEMENT MANUFACTURERS, HULL.—Light, Dark, and Portland Cements, equal to any made. Manufacturers also, and dealers in Plaster, Paris White, Mastic, Hair, Lime Lime, Laths, Slates, and Slate Slabs, Fire-bricks, Grindstones, Cement Chimney-tops, ditto Vases, Ridging, &c. Paints, Stucco, &c. Marble Merchants and Importers of Pumolano.

MESSRS. JOHN and WM. EASTWOOD are SOLELY engaged in the SALE of
Messrs. R. A. ALLEN and CO.'S
WHITE and RED FACING BRICKS, and SHAPED GOODS, from their Bullington and Californian Works, near Sudbury, Suffolk; the EWELL deep BLACK RUBBING and BUILDING BRICKS, and the EWELL and CHALFONT dark and bright RED RUBBERS.
And also SOLELY engaged in the SALE of
Messrs. CALEB HITCH and CO.'S
YELLOW and PALE MALM CUTTERS and FACING BRICKS, and KILN GOODS,
From their Fields at Ware, Hertfordshire.
COWLEY and KENT BRICKS,
in any quantities, by barge alongside.
The usual commission allowed to merchants of the trade from the monthly price-lists.
WELLINGTON WHARF, Belvidere-road, Lambeth; and KENT-ROAD BRIDGE.

BLUE LIAS, GREY STONE, and CHALK LIME
PORTLAND, ROMAN, and OTHER CEMENTS,
PLASTER, HAIR, LATHS, &c.
STAFFORDSHIRE PAVEMENTS & RIDGING.
Blue, Red, and Buff Terro-Metallic Paving Tiles of various designs. Blue and Red Plain and Ornamental Roofing Tiles in great variety. Plain, Rolled, Capped, and Pinnacled Ridge Tiles of different pitch, and Grooved Ridging, with Crest Ornaments, in Green, Blue, and Red, for the different periods. Vitrified Stable Pavings, Grooved, of various sizes. Blue Facing Bricks, &c.
FIRE-BRICKS, LUMPS, and TILES of all kinds. Pattern goods made to order.
RED GOODS of every description. Importers of DUTCH CLINKERS.
J. and W. EASTWOOD, Belvidere-road, Lambeth; and Kent-road Bridge.

PORTLAND CEMENT WORKS,
NORTHFLEET, KENT.
KNIGHT, BEVAN, and STURGE,
Manufacturers only of first-class quality, for the home and foreign trade.
Portland Cement is manufactured at these Works with especial reference to its destination, whether for stuccoing, brickwork, blocks for break-waters, tidal work, or otherwise.
LONDON WHARF, BELVIDERE-ROAD, LAMBETH.

COLES, SHADBOLT, and CO.
CEMENT and PLASTER MANUFACTURERS,
LIME BURNERS,
Brick, Tile, Drain-pipe, Hair, Lath, and Fire Goods Merchants,
ST. JAMES'S and THORNHILL WHARFS,
Caledonian-road, London.

MESSRS. ROSHER and CO.
LIME, CEMENT, and BRICK MERCHANTS,
LIME WORKS, CHALK, FLINT, and BALLAST WHARFS,
NORTHFLEET, KENT.
LONDON WHARFS:—
ALBION WHARF, HOLLAND-STREET, BLACKFRIARS, S.E.
MILLBANK-STREET, WESTMINSTER, S.W.
KINGSLAND BASIN, KINGSLAND-ROAD, N.E.
LIMEKILN-HILL, LIMEHOUSE, E.
Whereat can be obtained of the best quality:—
GREY-STONE, CHALK, and FLARE LIME
ROMAN, PORTLAND, KEENE'S, ATKINSON'S, MARTIN'S, and PARIAN CEMENTS.
COWLEY and KENT BRICKS.
WHITE and RED SUFFOLK FACING BRICKS.
YELLOW and PALE MALM-CUTTERS, PICKINGS, PAVIORS, and SECONDS.
STAFFORDSHIRE ORNAMENTAL PAVEMENTS, in RED, BLUE, and BUFF; also GARDEN EDGINGS.
TERRO-METALLIC GROOVED STABLE BRICKS, CHANNEL BRICKS, and CLINKERS.
PLAIN and ORNAMENTAL ROOFING and RIDGE TILES.
WELSH, NEWCASTLE, and STOURBRIDGE FIRE-BRICKS, LUMPS, and TILES of every description and size.
RED and GLAZED STONEWARE DRAIN-PIPES, &c.
TERRA COTTA, CEMENT, and RED CHIMNEY-POTS.
HAIR, PLASTER, LATHS, SAND, BALLAST, and other BUILDING MATERIALS.
Goods forwarded by Railway with despatch.

KEENE'S and PARIAN CEMENTS for internal uses. These well-known hard Stuccoes dry quickly, and can be painted upon within a few days. Made and sold by JOHN BAZLEY WHITE and BROTHERS, Millbank-street, Westminster.

TO ENGINEERS, MILLOWNERS, AND OTHERS.

MANUFACTURERS OF
VULCANISED AND UNVULCANISED INDIA-RUBBER,
IN EVERY FORM,
Buffer, Bearing, and Carriage Springs; Valves for Marine and Land Engines.
Tubing and other Appliances for Scientific Purposes.

ELASTIC CANVAS AND INDIA-RUBBER STEAM PACKING,
Which wears six times longer, economises Labour and Tallow, is always ready for use, and causes less Friction than any other Packing.
IMPORTERS OF
AMERICAN BELTING, BREWERS' HOSE, &c.
S. W. SILVER and CO.
Nos. 3 and 4, BISHOPSGATE-STREET, opposite the London Tavern.

DURABILITY of GUTTA PERCHA TUBING.—Many inquiries having been made as to the Durability of Gutta Percha Tubing, the Gutta Percha Company have pleasure in giving publicity to the following letter FROM SIR RAYMOND JARVIS, Bart. VENTNOR, ISLE of WIGHT.—Second Testimonial.—"March 10th, 1853.—In reply to your letter, received this morning respecting the Gutta Percha Tubing for Pump Service, I can state with much satisfaction, it answers perfectly. Many builders and other persons have lately examined it, and there is not the least apparent difference since the first laying down, now several years, and I am informed that it is to be adopted generally in the houses that are being erected here."
N.B. From this testimonial it will be seen that the CORROSIVE WATER of the ISLE of WIGHT has no effect on Gutta Percha Tubing.
THE GUTTA PERCHA COMPANY, PATENTEES,
18, WHARF-ROAD, CITY-ROAD, LONDON.

PERREAUX'S PATENT INDIA-RUBBER VALVES, for Feed Pumps of Steam Boilers, enable the Pumps to give one hundred per cent. of duty, and render derangement in the pumps a matter of impossibility.—Prospectuses, price-lists, testimonials, and references, at the Offices of the Patentees, PERREAUX and CO. 39, Mark-lane, City, E.C.

HANCOCK'S PATENT VULCANIZED INDIA-RUBBER TUBING, HOSE-PIPES, WASHERS, ENGINE-PACKING, both round and flat, and SOCKET-RINGS, for Hot-water Pipes. Vulcanized Rubber Door-springs, and Solid Round Rubber Cord of all sizes of any length. Billiard Cushions and Rubber Strips cut to any pattern for Bagatelle Tables.
Diving Dresses of superior make, and improved Vulcanized Rubber Supply-pipes for ditto.
Vulcanized Rubber in Sheets, from three to four feet wide, and of any thickness. Air-beds, Pillows and Cushions, Inflating Portable Baths, Invalid Cushions, and articles of this kind made to any pattern to order.
N.B. All communications and orders punctually attended to, addressed to the Manufactory, JAMES LYNE HANCOCK, Goswell-mews, Goswell-road, London.

MR. ALBERT SMITH'S MONT BLANC, NAPLES, POMPEII, and VESUVIUS, EVERY NIGHT (except Saturday) at Eight, and Tuesday, Thursday, and Saturday Afternoons at Three. Places can be secured at the Box-office, Egyptian-hall, daily, between Eleven and Four, without any extra charge.

EASTER HOLIDAYS.
THE ROYAL POLYTECHNIC.
Patron—H.R.H. the Prince Consort.—"The Grand Phenomena of Nature:" an entirely new series of Dissolving Views, with beautiful dioramic effects, painted by Messrs. Hine, Clare, Perring, and Davies, illustrating earthquakes, volcanoes, thunder-storms, parhelia, the aurora borealis, the spectre of the Brocken, mirage, avalanches, water-spouts, geysers, cataracts, wonderful caves, &c. with new descriptive Lecture, by J. D. Malcolm, Esq. daily, at a Quarter-past Four and a Quarter-past Nine. The highly effective Dissolving Scenery, illustrating the Rebellion in India, daily at Two. Curious live Insects in the oxy-hydrogen microscope, daily, at One and Half-past Seven.—First of a new course of popular Lectures (plentifully illustrated with Experiments), "On the Great Forces of Attraction," by J. H. Pepper, Esq. F.C.S., A. Inst. C.E. &c.—A new course of Lectures, by Thomas Griffiths, Esq. late Professor of Chemistry, St. Bartholomew's Medical College, and author of many popular works on chemistry, "On the Chemistry of Air, Earth, Fire, and Water." A new Musical Entertainment, on Tuesday, Thursday, and Saturday evenings, at Eight, by G. A. Cooper, Esq., assisted by Mrs. G. A. Cooper, entitled "The Excursion Train," being a Romance of the Rail, with new Buffo Songs.—For further particulars, see programme of the week, which is sent anywhere for two postage stamps.—Admission to the whole, 1s. Children under Ten and schools, half-price.